THE GENUS COCCOLOBA IN CUBA

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THE NEW WORLD GENUS *Coccoloba* is found from Bermuda and Florida on the North American continent, through the West Indies, Mexico and Central America, into South America with many species in the Amazon basin and a few species as far south as Argentina. In 1890, Lindau published a comprehensive monograph of this woody genus (Engl. Bot. Jahrb. 13: 106–229. 1890) which then included 125 species. Lindau's monograph is notoriously difficult to use and Britton, for his work on the West Indian vegetation, presented a series of treatments of the genus *Coccoloba* as it occurred on each of the islands he studied. Britton's first paper on the genus, in 1915, revised *Coccoloba* for Cuba. In following years Britton described additional new species from Cuba, as did Urban, and subsequent to their work Schmidt continued studies of the genus in Cuba and the Caribbean area. Thus, at the present time approximately 50 species have been reported from Cuba alone, either in the literature or in herbarium records.

The present paper, which considers the genus only in Cuba, is presented to clarify certain points of the morphology of the genus, to describe several new species from Cuba and Hispaniola, and to straighten out specific concepts and bring the nomenclature up to date to aid the work of contemporary students of the Caribbean vegetation.

The author is grateful to Brother Leon of the Colegio de la Salle in Havana, Cuba, for the introduction to this problem and also to Mr. Sandwith of Kew for invaluable help and consultation on certain problems of limitation of the species. Material for this work was supplied from the following herbaria: Arnold Arboretum (A), Jardin Botanique de l'Etat, Brussels, Belgium (BR), Botanical Museum, Copenhagen, Denmark (C), Chicago Natural History Museum (formerly known as the Field Museum) (FM), Gray Herbarium (G), Colegio de la Salle, Havana (HAB), Sauvalle Herbarium of the Academy of Science in Havana (HABA), Kew (K), Univ. of Michigan (MICH), Missouri Botanical Garden (MO), New York Botanical Garden (NY), Herbarium of Juan Roig (R), Natural History Museum, Stockholm, Sweden (S), Estacion Agronomica de Cuba (SV), and the United States National Herbarium (US). I am grateful to the directors and curators of these herbaria for the privilege of studying their material on loan.

In this paper I am following, with qualifications which are mentioned, the proposal of Little (Madroña 7: 244–246. 1944) that the name *Coccoloba* should be conserved. Patrick Browne (Civ. Nat. Hist. Jamaica 209, *pl. 14, f. 3.* 1756) originated the name *Coccolobis* (without generic description) for four species. Linnaeus (Syst. Nat. ed. 10, 1007, 1367.

1759) accepted Browne's four species and applied binomials to them but changed the spelling of the generic name to *Coccoloba* in publishing the first generic description. Recently Sandwith (Jour. Bot. 78: 99. 1940) has regarded *Coccolobis* P. Br. and *Coccoloba* L. as different names and adopted the original Browne name and spelling. Moreover, Sandwith states in his argument that *Coccolobis* is a diminutive name, thus a completely different word, and therefore transfers and new combinations are necessary when one name or the other is adopted. Fortunately for the present monographer *Coccolobis* is not a diminutive form, as *Coccolobion* would be, and the new combinations are not necessary. Actually no problem exists between these two words for *Coccolobis* of P. Browne is invalidly published as a generic name under the present rules of botanical nomenclature while *Coccoloba* L. is a valid publication with the first generic description of the group. Considerable search and bibliographic work would be necessary to determine who published the first valid generic description under the name *Coccolobis*.

However the name for this genus still involves a problem. The generic name *Guaiabara* Miller (Gard. Dict. ed. 4, vol. 2. 1754) is validly published with a generic description for the pre-Linnaean species later listed by Patrick Browne. Therefore *Coccoloba* L., the most widely accepted name for the group, must be conserved to continue in use. Little's proposal for conservation has been approved by the committee on nomenclature of the American Society of Plant Taxonomists and the case will be submitted for consideration and action at the International Botanical Congress in 1950. I am accepting Linneaus' name *Coccoloba* as only an orthographic variant of *Coccolobis,* thereby eliminating the need for new combinations of many of Britton's new species from Cuba, a step which would be necessary if one concluded that the two spellings of *Coccoloba* actually represent two different names.

Lindau's elaborate monograph of *Coccoloba* quite unfortunately introduces several very significant errors of interpretation of the morphology of the genus which has led subsequent workers astray and has built up considerable confusion in this genus.

Lindau considered the flowers of *Coccoloba* to be perfect, and only rarely unisexual by abortion. This is not the case, as careful study of herbarium material will show, and this is easily verified in field studies of the plants. The flowers are regularly unisexual and only occasionally are flowers of a male inflorescence perfect. In the course of field studies made in the Greater Antilles, Florida, and the Bahamas, within the past three years I have seen many species of *Coccoloba.* In all specimens examined in the field the plants were found to be dioecious and the staminate and pistillate plants readily distinguishable. Furthermore, the natives in the areas visited recognized the fact that some trees set fruit and other did not. Recent information from Cuba reports that cultivated specimens of *C. venosa* L. have perfect flowers in some of the staminate inflorescences so the plants may be described as dioecious, occasionally monoecious.

This condition has been recognized by a few workers but has not been incorporated in floristic treatments.

The staminate flowers are usually clustered at each node of the inflorescence. Two to five flowers are commonly produced in the axil of a single bract. In these flowers the stamens elongate and are exserted and the pistil is rudimentary with short contorted styles. Pistillate plants by contrast bear only one flower at each node on the inflorescence axis and in these the stamens are rudimentary, never developing pollen, and are included while the pistil is larger and exserted with longer divergent styles. Lindau recognized these differences in form, i.e., stamens exserted or included, flowers clustered or solitary, but failed to associate a unisexual condition with this morphological pattern. Thus one finds in Lindau's key to the species of *Coccoloba* the basic separations of flowers clustered versus flowers solitary, or stamens exserted versus stamens included. In more than one case the male and female plants of the same species have been described under different specific names.

The unisexual condition of the flower and the pattern of numerous flowers per node in the staminate plants may be confused slightly in the field by the fact that occasionally a male plant will form sterile fruits. This was observed in several male plants of *Coccoloba uvifera* growing in Loomis Park at Miami Beach, Florida. However, in this species the seed was either imperfectly formed in all the fruits sectioned or the fruit was hollow. Likewise these "male" fruits dehisced easily from the pedicels and rarely approached the size of the mature fertile fruits from the pistillate plants.

The habit of growth of the species of *Coccoloba* found in the West Indies has also led to confusion in the interpretation of the species and the formation of descriptions. Three growth habits can be observed in the field and can also be recognized on herbarium material. In one growth form, short shoots are produced. In these the branches are of determinate length with very short internodes. The short shoots may be terminal or lateral. The terminal short shoots frequently resume normal growth after a few seasons as short shoots and so the congested area of short compact internodes may be in the middle of a shoot of normal appearance.

The second form is the normal one, with vigorous shoots of uniformly elongated internodes. The third form is found in adventitious shoots which are produced when the original shoot is cut or damaged. These three forms are significant because of the different size and shape of the leaves produced on each. Adventitious shoots with extremely long internodes will have much larger leaves on larger petioles and with longer ochreae than those of the normal shoots. The leaves of short shoots are commonly smaller in these characteristics than those of the normal shoot. Because of the variation of leaf shape on a single plant, the shape of the leaf, particularly the nature of the leaf apex is not a good taxonomic character and where used must be considered with caution.

The large number of species described by Britton, Urban and Schmidt which I have reduced to synonymy in this paper are commonly based on

the failure of these men to recognize the condition of variant growth. The sterile Ekman specimens from Cuba which Schmidt referred to *C. longifolia*, a Jamaican species, are adventitious shoots of *C. diversifolia*. The species described by Schmidt as *C. lineari-lanceolata* is material from an adventitious shoot of *C. pallida*, and the species *C. pilonis*, *C. acutissima* and *C. woodfredensis* described by Urban and Britton are adventitious shoots or short shoots of *C. reflexa* of Lindau based on a Wright collection.

Once these peculiarities of *Coccoloba* are recognized the species appear more clear-cut and it is hoped that the genus may be completely clarified by the work which is now in progress.

Little described *Coccoloba* as "a large genus of about 130 species". Actually nearly 400 names have been published for this genus. The large genus has been divided into sections by Wright (Griseb. Cat. Pl. Cub. 62. 1866), Meisner (DC Prod. 14: 150–171. 1856) and Lindau (l.c.) in their work on the group. The section as defined by those authors in the original form are not acceptable today in view of our present knowledge of additional species from intermediate areas. The problem of subdividing this large genus will be considered in a later publication. For the present paper I am not dividing the genus although three of the sections recognized by Lindau are represented in the species which follow.

No attempt will be made in this paper to give other than the most important bibliographic references. For a complete list of important as well as casual references to any of the following species, Lindau's monograph of the genus *Coccoloba* (Engl. Bot. Jahrb. 13: 106–229. 1890) and his later paper in Urban, Symbolae Antillanae (1: 215–233. 1899) present most of the literature prior to 1900. Britton's earlier treatment of the genus *Coccolobis* in Cuba appeared in the Bulletin of the Torrey Botanical Club, 42: 365–371. 1915.

Coccoloba L. Syst. Nat. ed. 10, 1007, 1367. 1759.

Shrubs or trees; branches terete, often geniculate, or arranged in one plane, short shoots commonly developed laterally or the terminal shoots of limited growth becoming long shoots; nodes commonly tumid; ochreae characteristically developed, membranaceous or coriaceous, deciduous or persistent, glabrous, puberulent or pilose; leaves alternate, minute to large, membranaceous, chartaceous or coriaceous, the margin entire to undulate, flat or revolute, the primary veins straight to the margin, much branched at the apex becoming reticulate or arcuate and anastomosing or arcuate and bifurcate-anastomosing, the secondary venation obscure or coarsely to minutely reticulate, the upper leaf surface commonly pitted, rarely pubescent, the lower leaf surface glabrous to pilose, short multicellular glands present or the glands depressed in the lamina producing resinous secretions; petioles terete to stout, broadly and shallowly canaliculate above, pilose to glabrous, the base often tumid, attached at the base of the ochreae or above the base to two-thirds the length of the ochreae; plants dioecious or monoecious; inflorescence racemose of sub-spicate, terminal on the primary or lateral branches, few flowered and short to

many flowered and several times the length of the leaves, the rhachis glabrous, puberulent, pilose or with glandular excretion; flowers unisexual, the staminate flowers in clusters of 2–5 at each node of the inflorescence, occasionally solitary, the pistillate flowers solitary; bracts subtending each node, the flowers developing in a membranaceous sheath which ruptures irregularly becoming an ochreola, the ochreolae membranaceous, 1 per flower, rarely stalked, the flowering pedicels shorter than the ochreolae to many times as long, the flowers articulated at the apex of the pedicel; perianth campanulate at the base forming a hypanthium, the lobes 5, imbricate, the outer three slightly larger than the inner, the stamens 7 or 8 borne on the hypanthium, the filaments united at the base, the anthers introrse, the stamens in the pistillate flowers rudimentary; pistil rudimentary in the staminate flowers, trigonous in the pistillate flower, the styles 3, dilated at the apices, the ovary 1 celled, the ovule solitary, attached basally; perianth expanding in fruit, the lobes surrounding the achene or the hypanthium expanding surrounding the achene with the perianth lobes appressed against the apex of the achene or coronate on the achene, the achene with a hard shiny outer layer, the inner layer papery; seed with ruminated endosperm, the major lobes 3, the minor lobes and involutions numerous, the embryo centrally located, the cotyledons orbicular, flat rarely folded, the radicle small, terete.

TYPE SPECIES: *Polygonum uvifera* L.

KEY TO THE SPECIES

A. Perianth lobes investing the achene; leaves usually membranaceous; ochreolar sheath commonly elongating with the flowers; bracts usually black.....1. *C. venosa.*

AA. Hypanthium investing the achene, the perianth lobes appressed against the apex of the achene or coronate on the achene; leaves coriaceous or chartaceous (membranaceous in *C. tenuifolia*); ochreolae not elongating with the flowers but broken early; bracts usually straw colored or brown.

B. Inflorescence short, 1–5 flowered, only rarely equalling the leaves; leaves 1–1.5 cm. long.

C. Leaves emarginate at the apex, cordate at the base, turning black on drying.....2. *C. microphylla.*

CC. Leaves spinose-mucronate or rigidly acuminate at the apex, turning dark but not black on drying.

D. Leaves cordate-ovate, the base strongly cordate, the apex long spinose.....3. *C. armata.*

DD. Leaves ovate to suborbicular, the base rounded to subcordate, the apex rigidly acuminate, not long spinose.....4. *C. geniculata.*

BB. Inflorescence several to many flowered, elongate, 2.5–30 cm. long, shorter than the leaves to several times as long as the leaves.

C. Leaves spinose tipped or rigidly acuminate; leaf blades ovate to oblong, glabrous; rhachis of the inflorescence puberulent; pedicels slightly surpassing or twice the length of the ochreolae in fruit.....5. *C. reflexa.*

CC. Leaves acute, acuminate, rounded or emarginate, not spinose or rigidly acute at the apex.
D. Leaves persistently pubescent, at least below.
E. Leaves puberulent on both surfaces; veins straight to the margin not anastomosing.....6. *C. Clementis.*
EE. Leaves glabrous above, persistently pubescent below.
F. Leaves orbicular, generally umbonate; veins straight to the margin, not anastomosing; pedicels shorter than the ochreolae; rhachis, bracts and ochreolae pilose.....7. *C. Acuña.*
FF. Leaves ovate, oblong or elliptic, flat not umbonate; veins arcuate and anastomosing near the margin.
G. Ochreolae pedicellate, borne at the apex of stout stalks; leaves white pubescent below, the blade turning black on drying.....8. *C. caesia.*
GG. Ochreolae sessile; leaves not turning black on drying.
H. Mature flowering pedicels or those of the fruit shorter than the ochreolae; leaves pale puberulent below, the hairs blunt at the apex.....9. *C. pallida.*
HH. Mature flowering pedicels or those of the fruit exceeding the ochreolae; hairs attenuate at the apex.
I. Flowering and fruiting pedicels 7–15 mm. long; leaves thick coriaceous; pedicels and flowers bright red.....10. *C. coriacea.*
II. Flowering and fruiting pedicels 1–3 mm. long; pedicels brown or tan; flowers greenish white.
J. Leaves thin coriaceous, persistently pubescent below on the entire lamina; petioles arising from the base of the ochreae; inflorescence 2.5–3.5 cm. long.....11. *C. retirensis.*
JJ. Leaves membranaceous, barbate in the axils of the veins, glabrate on the lamina; petioles arising from above the base of the ochreae; inflorescence 8–18 cm. long.....12. *C. tenuifolia.*
DD. Leaves glabrous below when mature (rarely puberulent when young).
E. Leaves orbicular to reniform, rounded or emarginate at the apex.
F. Fruiting pedicels shorter than the ochreolae; perianth lobes coronate in the fruit, equaling the fruit in length; fruit pilose..13. *C. baracoensis.*

FF. Fruiting pedicels exceeding the ochreolae; perianth lobes shorter than the fruit, coronate or appressed; fruit glabrous.

G. Rhachis of inflorescence keeled below the nodes; leaves thick coriaceous, the secondary venation obscure; fruit oblong, the perianth lobes not coronate.....14. *C. nipensis.*

GG. Rhachis of inflorescence terete or angled, not keeled.

H. Leaves broader than long, thick coriaceous, not turning black on drying; fruit obpyriform.....15. *C. uvifera.*

HH. Leaves thin coriaceous or chartaceous; fruit ovoid, perianth lobes more or less coronate.

I. Leaves coarsely reticulate veined on both surfaces, turning black on drying.

J. Rhachis of inflorescence puberulent; primary veins of the leaves free to the margin.....16. *C. Northropiae.*

JJ. Rhachis of inflorescence glabrous; primary veins of the leaves arcuate, anastomosing near the margin..17. *C. retusa.*

II. Leaves smooth above, finely reticulate below, not turning black on drying; inflorescence puberulent; veins anastomiosing near the margin.....18. *C. praecox.*

EE. Leaves ovate, oblong, elliptic but not orbicular.

F. Rhachis puberulent to pilose.

G. Fruiting pedicels shorter than the ochreolae or only slightly exceeding them.

H. Inflorescence stout, 10–30 cm. long; leaves thick coriaceous, generally more than 10 cm. long.

I. Veins of the leaves straight to the margins; perianth red, puberulent..19. *C. Shaferi.*

II. Primary veins arcuate, anastomosing near the margins; perianth white, glabrous.....20. *C. costata.*

HH. Inflorescence slender, 2–6 cm. long; leaves thin coriaceous, generally less than 7 cm. long.

I. Fruit obovoid, the lobes appressed against the apex of the achene; secondary venation reticulate on both surfaces, leaves commonly with

glandular excretions resembling peltate scales on the lower surface.... .....21. *C. benitensis.*

II. Fruit ovoid, the perianth lobes more or less coronate; leaves smooth, not reticulate above, without noticeable glandular excretions.

J. Leaves smooth on both surfaces, the lamina thin coriaceous, not rigid, the apex acute to obtuse but not mucronate; petioles pilose; pedicels of the fruit shorter than the ochreolae..... .....22. *C. rufescens.*

JJ. Leaves smooth above, minutely reticulate below, the lamina usually rigidly coriaceous, the apex acute or acuminate, commonly short spinose mucronate; petioles puberulent; fruiting pedicels equal to or rarely half again as long as the ochreolae..... .....5. *C. reflexa.*

GG. Fruiting pedicels 2–10 times as long as the ochreolae.

H. Leaves broader than long, thick coriaceous, without conspicuous reticulate venation.....15. *C. uvifera.*

HH. Leaves longer than broad; secondary venation reticulate, at least below.

I. Mature leaves 3–5 cm. long, oblong-ovate to orbicular.

J. Primary veins straight and free to the margins, the leaf blades usually turning black on drying, shining above, commonly reticulate on both surfaces..... .....16. *C. Northropiae.*

JJ. Primary veins arcuate, dichotomous and anastomosing near the margin, the leaf blades not turning black on drying, smooth above, minutely reticulate below.

K. Leaf apex rounded or emarginate; perianth lobes imbricate, appressed against the apex of the achene....18. *C. praecox.*

KK. Leaf apex acute to acuminate, often spinose mucronate; perianth lobes

more or less coronate.... .....5. *C. reflexa.*

II. Mature leaves 8–25 cm. long.

J. Leaves membranaceous, commonly barbate in the axils when mature; petioles attached above the base of the ochreae..... .....12. *C. tenuifolia.*

JJ. Leaves coriaceous, glabrous; petioles attached at the base of the ochreae.

K. Fruiting pedicels 8–15 mm. long.....10. *C. coriacea.*

KK. Fruiting pedicels 3–5 mm. long.

L. Leaves conspicuously coarsely reticulate on both surfaces, the blade with glandular excretions below..... .....23. *C. Wrightii.*

LL. Leaves smooth or minutely reticulate on both surfaces; glands usually sunken, excretions not evident.

M. Leaf blades smooth ....20. *C. costata.*

MM. Leaf blades minutely reticulate. 15a. *C. uvifera* × *diversifolia.*

FF. Rhachis glabrous or with glandular excretions.

G. Rhachis and flowers with glandular excretions appearing as scales or peltate protuberances.

H. Perianth lobes coronate in fruit, the fruit 7–9 mm. long; leaf blades with small glandular excretions below..... .....23. *C. Wrightii.*

HH. Perianth lobes appressed to the apex of the achene.

I. Leaf blades ovate, cordate or rounded and unequal at the base, apex rounded or obtuse; glands sunken in pits or depressed; fruit fusiform, 10 mm. long or longer....24. *C. Leonardii.*

II. Leaf blades oblong, narrowed at the base, acute to acuminate at the apex; glandular excretions appearing as peltate scales; fruit ovoid to globose, to 6 mm. long.....21. *C. benitensis.*

GG. Rhachis and flowers glabrous.

H. Fruiting pedicels shorter than the ochreolae.

I. Primary veins straight to the margin; leaf blades thick coriaceous; petioles glabrous.....19. *C. Shaferi.*

II. Primary veins arcuate, anastomosing near the margin; leaf blades thin coriaceous.

J. Fruit ovoid, the perianth lobes coronate; petioles pilose pubescent .....
..25. *C. Swartzii* f. *pubescens.*

JJ. Fruit fusiform, the perianth lobes appressed and imbricate against the apex of the achene; petioles glabrous.....
.....24. .*C. Leonardii.*

HH. Fruiting pedicels longer than the ochreolae.

I. Leaves bullate, cordate auriculate at the base; flowers red on pedicels 5 mm. long; fruiting pedicels 10 mm. long.....26. *C. Cowellii.*

II. Leaves flat; flowers green or white.

J. Leaf blades cordate at the base, minutely reticulate on both surfaces; flowering pedicels 7–10 mm. long; fruiting pedicels to 15 mm. long...10. *C. coriacca.*

JJ. Leaf blades rounded or narrowed at the base, not cordate.

K. Leaves shining above when dry, usually turning black on drying; fruit ovoid, the perianth lobes coronate, the fruit to 6 mm. long.....
.....17. *C. retusa.*

KK. Leaves dull, dark but not black on drying; fruit globose to obpyriform, the perianth lobes appressed against the apex of the achene, the mature fruit 10–13 mm. long.....
.....27. *C. diversifolia.*

1. **Coccoloba venosa** L. Syst. Nat. ed. 10, 1007. 1759; Fawcett and Rendle, Jour. Bot. 51: 123. 1913.

Coccoloba punctata L. Sp. Pl. ed. 2, 523. 1762.

Uvifera arbor americana, fructu aromatico punctatus, Pluk. Alm. 394. *t. 237, fig. 4.* 1696, as to leaf only.

Coccoloba nivea Jacq. Hist. Stirp. Amer. 115, *pl. 78.* 1763; Enum. Pl. 19. 1762.

Guaiabara venosa (L.) House, Am. Midl. Nat. 8: 64. 1922, (as *Guaibara*).

Trees to 10 m. tall; branches terete, glabrous, the nodes not tumid; ochreae membranaceous, deeply cleft, acuminate on one side, or truncate, to 2 cm. long, glabrous or with flattened glands; leaf blades oblong-lanceolate to elliptic, the apex short acuminate, the base narrowed and slightly cordate or cuneate or obtuse, 8 × 4, 10 × 4.5, 16.5 × 6.5, 21 × 9, 27 × 10.5 cm. long and broad, membranaceous, glabrous except for clusters of hairs in the axils of the veins, sparsely glandular below; midrib and primary veins slightly prominent on both surfaces, the primary veins 8–13 pairs, straight or arcuate, bifurcate and anastomosing at the margins, the petioles 5–10 mm. long, glabrous; leaves of the adventitious shoots about the same size, the internodes much elongate and the ochreae to 4 cm. long; inflorescence terminal or terminal on short lateral branches, the rhachis puberulent, angular; staminate flowers in clusters of 2–5, the pistillate flowers solitary, the bracts lanceolate-ovate, to 1.5 mm. long, black, puberulent to pilose or commonly with a fringe of hairs at the apex; ochreolae membranaceous, enlarging with the expanding bud, each flower with an ochreola, to 2 mm. long, the flowering pedicels 1–2 mm. long, glabrous; hypanthium less than 0.5 mm. long, the perianth lobes broadly ovate, 1.5–2 mm. long and broad, slightly unequal, the fertile stamens to 1 mm. long; fruiting pedicels 1.5–2.5 mm. long, the fruit broadly ovoid, the perianth lobes fleshy, white or pink enclosing the black achene, the hypanthium scarcely evident in the fruit, the fruit 3–4 mm. long and broad.

DISTRIBUTION: Cuba (introduced), Hispaniola, Puerto Rico, Jamaica, Virgin Islands, Lesser Antilles, Trinidad.

CUBA: Las Villas: Atkins Garden, Soledad, P. I. 98831 collected by Walsingham without number (G). In flower and fruit Nov. and March.

The history and synonymy of this species is quite confused. Fawcett and Rendle did considerable work in publishing their note on this species for the Flora of Jamaica. While *C. nivea* Jacq. has a clear-cut description and is well illustrated and might well be selected as the type, I am following Fawcett and Rendle's interpretation since it is now widely accepted in the Caribbean area. Lindau was completely confused in his treatments of *C. punctata, C. excoriata* and *C. venosa* and his work is difficult to untangle.

The specimen from Cuba is an introduction now under cultivation at the Atkins Garden at Soledad. The records of the garden list this as a plant introduced by the United States Department of Agriculture with

the number 98831 from Great Inagua in the Bahamas. There are no specimens of this species from the Bahamas in the collections I have studied and either the place of origin of this cultivated material is confused or the specimen might be growing in the Bahamas, also under cultivation, without herbarium records available.

According to correspondence with H. G. Walsingham of the Atkins Garden there is but one specimen in the Garden. That tree flowers and fruits regularly. From field studies made of other species I have concluded that the genus *Coccoloba* consists of dioecious plants; however, this specimen from Cuba must be monoecious. The majority of the ten herbarium specimens I have for study from the Soledad plant are with staminate inflorescences and flowers. On four specimens the flowers are perfect and have developed fruit. No truly pistillate flowers were seen in this collection.

The fruits of *C. venosa* are extremely attractive with the white or pink fleshy perianth lobes surrounding a jet black achene. Jamaica has been assumed the type locality of this species although, as Fawcett and Rendle point out, no collections are known from that island.

2. **Coccoloba microphylla** Griseb. Cat. Pl. Cub. 62. 1866.

Uvifera microphylla O. Ktze. Rev. Gen. **2**: 561. 1891.

Virgate shrub 1–2 m. tall to small tree 5 m. tall, branches often arranged in one plane, commonly with brown shredding bark, the youngest branches puberulent, nodes not at all tumid; short shoots well developed, often spine-like at the tips; ochreae subcoriaceous, 1 mm. long, puberulent, commonly dehiscent from the side opposite the petiole and remaining attached to the petiole, appearing as auriculate wings; leaf blades orbicular to reniform, apex emarginate, base slightly cordate, 1 × 1, 5 × 5 mm. long and broad, coriaceous, turning black on drying, venation reticulate, conspicuous on both surfaces; inflorescence terminal on short shoots, rhachis very short, flowers appearing subsessile; bracts ovate, less than 0.5 mm. long, ochreolae membranaceous, less than 0.5 mm. long, flowering pedicels 0.5 mm. long, hypanthium less than 0.5 mm. long, perianth lobes 1 mm. long and broad, fertile stamens 1 mm. long; fruiting pedicels less than 1 mm. long, fruit not known.

DISTRIBUTION: Cuba.

CUBA: Oriente: Sierra de Nipe, at Rio Piloto, *Ekman 15069* (S); Gamboa, *Ekman 14996* (A, FM, G, NY, S, US). Matanzas: Pan de Matanzas, SE of Canasí, *Ekman 16513* (S); E. of Canasí, Cuabal del Espinal *Leon 12975* (NY). Las Villas: Cieneguita, *Combs 725* (FM, G, MO, NY, US); San Marcos, *Wright 2249* (type collection, G, MO, NY, S), *Leon 9187* (NY); Motembo, *Leon, Edmund & Fortún 8554* (NY), *Leon & Laustalot 11368* (NY). Pinar del Rio: Coloma, *Britton, Britton & Gager 7023* (NY), *Roig & Fors 4214* (NY). Isle of Pines: Siguanea, *Britton, Britton & Wilson 15376* (NY, US), *Ekman 12183* (US). Collected in flower: Feb., Aug., Sept. Local name: *uverillo*.

3. **Coccoloba armata** Griseb. Cat. Pl. Cuba 62, 283. 1866; Sauvalle, Fl. Cub. 139. 1868; Britton, Bull. Torrey Bot. Club **42**: 366. 1915.

Uvifera armata O. Ktze. Rev. Gen. **2**: 561. 1891.

Much branched shrub 1–3 m. tall becoming a tree 10 m. tall; branches commonly in one plane, puberulent, nodes slightly tumid; ochreae 1 mm. long, commonly breaking free on the side away from the petiole; leaf blades cordate, apex rigid, long spinose mucronate, base cordate, 5 × 4, 12 × 9 mm. long and broad, coriaceous, glabrous, midrib impressed above, primary veins inconspicuous, upper surface smooth, lower surface minutely reticulate, margin slightly erose or entire, flat or recurved; petioles 1 mm. long, base tumid or corky, leaves of adventitious shoot 18 × 18 mm. long and broad; flowers in short terminal inflorescence, 2 or 3 flowers clustered together, rhachis very short or none, bracts ovate, less than 0.5 mm. long, ochreolae membranaceous, 0.5 mm. long, flowering pedicels less than 0.5 mm. long, perianth yellow-white, hypanthium less than 0.5 mm. long, perianth lobes 1 mm. long and wide, fertile stamens 1 mm. long; fruiting pedicels less than 1 mm. long; fruit ovoid, narrowed at both ends, to 5 mm. long, 4 mm. in diameter, red, mature perianth lobes appressed against the apex of the achene, achene dark brown or black.

DISTRIBUTION: Cuba.

CUBA: Oriente: Guantanamo Bay, *Britton 1974* (NY); La Carbonera, Guantanamo, *Ekman 2878* (FM, S, US), *Ekman 10170* (A, S); Sierra de Nipe, near Rio Piloto, *Ekman 9993* (S); Bay of Sagua, Tánamo, *Linden 1857* (BR). Las Villas: Motembo, *Leon, Edmund & Fortún 8556* (NY), *Leon & Roca 8205* (NY); Mordazo, *Leon & Cazañas 5975* (NY); Calicita, Loma de Ciego, *Combs 531* (FM, G, MO, NY, US); Rio San Juan, *Britton, Earle & Wilson 5890* (NY); Manacas, *Howard 5503* (G). Havana: Madruga, *Leon & Cesàire 8956* (NY); Loma Coca near Campo Florida, *Ekman 13217* (S); Miñas, *Ekman 13140* (NY, S). Pinar del Rio: Sierra de Viñales, *Ekman 16587* (S); Cabañas Bay, *Ekman 10930* (NY, S); San Marcos, *Wright 2250* (G, MO, NY, S, US, type Collection). Collected in flower: May, Aug., Nov. Collected in fruit: Jan., Aug., Sept., Nov., Dec.

The original description of this species in Cat. Pl. Cuba lists *Wright 1250* as the specimen upon which the species is based. This is corrected in the emended list of Wright collections (l.c. 288) to read *Wright 2250*.

Field studies on this species are much needed. There are two aspects to the leaves of herbarium specimens. In some the leaves are smooth, in others minutely reticulate on both surfaces. In addition the plants of these two divisions have a slightly different appearance. At present there is no satisfactory way of handling these two divisions and all are cited as one species.

The majority of the specimens cited above are sterile. The flowers are small and the almost complete absence of an inflorescence axis adds to the difficulty of selecting flowering or fruiting material in the field.

4. **Coccoloba geniculata** Lindau, Engl. Bot. Jahrb. **13**: 141. 1890.

Uvifera geniculata O. Ktze. Rev. Gen. **2**: 561. 1891.

Virgate shrub, 1–2 m. tall; branches commonly short, contorted or geniculate, the youngest puberulent, nodes slightly tumid, ochreae cylindrical, membranaceous, oblique at the apex, 2–3 mm. long, leaf blades ovate to suborbicular, often umbonate, apex acute, commonly with a spiny mucro, base rounded, 1.5 × 1, 2.5 × 1.5, 3 × 2.5 cm. long and broad, coriaceous, glabrous, smooth often shining above, dull beneath, midrib impressed above, prominent below, primary veins 9–11 pairs, inconspicuous, secondary venation obscure, leaf surface glandular dotted above and below, margin entire, recurved; petioles 2–4 mm. long, puberulent or papillose, tumid at the base; leaves of adventitious shoots ovate, 4 × 2 cm. on petioles 5 mm. long; inflorescence terminal, often clustered, 0.5–1.5 cm. long, rhachis papillose rarely minutely puberulent, staminate flowers in clusters of 3–8, female flowers solitary, female inflorescence short, generally consisting of 1–3 flowering nodes; bracts membranaceous, 1.5–2.5 mm. long, 2–3 mm. broad, glabrous; ochreolae membranaceous, several concentrically arranged, flowering pedicels to 1 mm. long, perianth pink, hypanthium 0.5 mm. long, perianth lobes 1.5 mm. long and broad, filaments of fertile stamens less than 1 mm. long; fruit from a staminate plant ovoid, 5 mm. long, 2.5 mm. diameter, glabrous, perianth lobes appressed against the apex of the achene.

DISTRIBUTION: Cuba.

CUBA: Oriente: Sabana de Yaba, Yareyal, Holguin, *Leon 15783* (NY). Camaguey: Santayana, *Ekman 15339* (A, FM, NY, S); Caobilla, *Acuña 8876* (R. #4029, S. V. #8876, Herb. C. E. Baker #13700). Las Villas: Santa Clara city, *Ekman 14042* (S), *16331* (S), *18842* (NY, S), *Leon 14950* (NY), *Britton & Cowell 10199* (NY), *13325* (NY), *Britton, Britton & Wilson 6189* (NY); Puerto Principe, *Wright 2255* (G, NY, MO, HABA, type Collection). Collected in flower: Feb., Mar., June, July, Oct. Collected in fruit: July.

Unfortunately the specimen (*Wright 2255*) on which Lindau based this species consists of adventitious shoots or fast growing shoots with larger leaves, and an abnormal inflorescence. Lindau's use of the specific epithet *geniculata* refers to the angular path of this abnormal inflorescence. It could, however, apply as well to the commonly geniculate nature of the branch system of the more typical plants now assigned to the species. The specimens collected by *Britton & Cowell 13325* and *Britton, Britton & Wilson 6189* show the relationship between the normal short shoot geniculate type of growth and the occasional adventitious shoot with the larger leaves.

In the plants with more normal growth habit than the type collection the inflorescence is short, rarely exceeding 1 cm. in length. Three to eight staminate flowers are clustered in concentric ochreolae as in the Wright specimen but the flowering axis is much shorter. In the female plants I have examined the flowering axis is likewise very short and may consist

of only three nodes with a total of three flowers, one per node of the rhachis.

The fruit mentioned in the description above was one of two fruits attached to the specimen collected by *Ekman 15339*. This specimen has staminate flowers on the plant but as occasionally happens the ovary may develop and apparently a mature fruit is produced. In this case, as in many cases I examined in the field, the fruit was hollow, with no evidence of an embryo and endosperm being formed. The shape and size of this fruit may be regarded as indication of that of fertile fruits. This conclusion is based on evidence obtained from the study of other fruits of similar abortive nature from other species studied in the field.

5. **Coccoloba reflexa** Lindau, Engl. Bot. Jahrb. **13**: 141. 1890.

Coccoloba pilonis Urb., Fedde Repert. Sp. Nov. **13**: 445. 1914; Schmidt, Fedde Repert. Sp. Nov. **32**: 79. 1933.
Coccolobis woodfredensis Britton, Bull. Torrey Bot. Club **42**: 367. 1915.
Coccoloba acutissima Urb., Fedde Repert. Sp. Nov. **18**: 113. 1922.
Uvifera reflexa O. Ktze. Rev. Gen. **2**: 562. 1891.

Shrub 1–2 m. tall; branches terete often geniculate, puberulent when young, nodes slightly tumid; ochreae membranaceous, puberulent 2–5 mm. long; leaf blades ovate to ovate-elliptic or oblong, rarely lanceolate, apex abruptly acuminate, often spinose mucronate, base rounded to slightly cordate, 4 × 2, 5.5 × 2.5, 7 × 4, 8 × 3 cm. long and wide, coriaceous, smooth and shining above, dull beneath, glabrous except for the puberulent midrib, primary veins 5–7 pairs straight to arcuate anastomosing, inconspicuous, secondary venation reticulate below, blade punctate glandular dotted on both surfaces, margin entire, commonly recurved; petiole 3–6 mm. long, puberulent; inflorescence terminal, 2.5–8 cm. long, rhachis puberulent, staminate flowers in clusters of 2–5, pistillate flowers solitary, bracts ovate, 0.5 mm. long, ochreolae membranaceous, 0.5 mm. long, flowering pedicels 0.5–1 mm. long, hypanthium 0.5 mm. long, perianth lobes 1–1.3 mm. long and broad, fertile stamens 1 mm. long; fruiting pedicels 0.8–1.2 mm. long, fruit black, ovoid, to 6 mm. long, 3 mm. diameter, perianth lobes appressed against the apex of the achene.

DISTRIBUTION: Cuba.

CUBA: Oriente: Loma Pilon near Holguin, *Shafer 1232* (type collection of *C. pilonis*, NY, US), *Ekman 3289* (S); Cerro de Fraile, Holguin, *Ekman 7582* (S), *Ekman 15716* (S); Sabana de la Yaba, Yareyal, *Leon 15702* (NY); Sierra de Nipe, Rio Piloto, *Ekman 2718* (S), *19149* (S), *19162* (S), *2237* (type collection of *C. acutissima*, S); Loma Mensura, Sierra de Nipe, *Ekman 9733* (S); Cabeza de Nipe, Sierra de Nipe, *Ekman 2479* (S); Bio-Trail, Sierra de Nipe, *Ekman 4787* (S); ridge between Rio Bayate and Rio Piedra, Sierra de Nipe, *Ekman 15035* (S); Woodfred to Piedra Gorda, Sierra de Nipe, *Ekman 15255* (S), *Shafer 3180* (type collection of *C. woodfredensis*, NY); Punta Padre, *Curbelo 109* (NY); Playa Vaca, Moa, *Acuña 12408* (SV). Without locality: *Wright 2256* (type collection of *C. reflexa*, G, MO, HABA). Collected in flower: July, Aug., Sept. Collected in fruit: July, Aug., Sept., Oct., Nov., Dec.

Schmidt pointed out in his paper in Fedde, Rep. **32**: 79. 1933, that the present collection of specimens represents the extremes of a species with variable leaf shapes. In doing so Schmidt reduced *C. woodfredensis* and *C. acutissima* to the synonymy of *C. pilonis*. Unfortunately Schmidt did not look far enough, for *C. reflexa* of Lindau based on a Wright collection (*2256*) represents the same species and being an older name must be used for this species.

Again the variation in the leaves can be associated with the growth habit of the plant, the larger and narrowed leaves of the type of *C. acutissima* are vigorous shoots while the smaller leaves represent a more normal growth pattern. All types of leaves can be found on one or a few sheets of the same collection. The large number of collections from the vicinity of Holguin and from Sierra de Nipe indicate the range of variation to be expected in one species in one area.

As Schmidt correctly points out the amount of puberulence on the rhachis of the inflorescence varies considerably from specimen to specimen. Also the characters Britton used to separate *C. woodfredensis* and *C. pilonis* in his revision of the genus *Coccoloba* (Bull. Torrey Bot. Club **42**: 365. 1915) are entirely variable and can not be used.

6. **Coccoloba Clementis**, sp. nov.

Frutex ramulis teretibus, nigrescentibus exsiccis, puberulis, ochreis brunneis, membranaceis, puberulis, petiolos 6–8 mm. excedentibus, unilateraliter perincisis, apice dilatatis; lamina matura obovata vel elliptica, apice rotundata, basi acuta vel rotundata, chartacea, supra et subtus persistente puberula et glandulosa, 5 × 3.5 vel 6 × 4 cm. longa et lata, margine undulato maturitate recurvato, nervo medio supra subconspicuo, nervis primariis supra inconspicuis, nervo medio et venis subtus prominentibus, nervis primariis 3–5, ad marginem rectis, non anastomosantibus, venis secondariis obscuris; petiolis 3–5 mm. longis, supra subcanaliculatis, puberulis; inflorescentia terminalis 5–12 cm. longa, rhachi dense puberulo, bracteis late ovatis plus minusve 0.5 mm. longis, 1.5–2 mm. latis, puberulis, brunneis, membranaceis, ochreolis circa 0.5 mm. longis, puberulis, pedicello puberulo ochreolas non excedente; floribus masculinis 2 vel 3 per nodulum puberulis, hypanthio 1 mm. longo, lobis 5, imbricatis, exterioribus 1.5 × 1 mm. longis et latis, interioribus sub-brevioribus, staminibus 7 vel 8, filamentis plerumque 1 mm. non aequantibus antheris circa 0.5 mm. longis; pistillo rudimentario ad 1 mm. longo, stylis 3; flos foemina et fructus ignotus.

CUBA: Oriente: Rio Cromita, Cayoguain, Punta Gorda, *Clemente 4097* (TYPE, G; ISOTYPE, HAB).

The specimens cited above were collected in flower on July 25th. The species is distinct from others from the West Indies in the undulate leaf margin and the persistent puberulence on both leaf surfaces.

7. **Coccoloba Acuña**, sp. nov.

Frutex ramulis teretibus, pilosis, nodis tumescentibus; ochreis membranaceis, pilosis, 2–4 mm. longis, ad basin cylindricis, ad apicem sursum

dilatatem et obliquis; lamina orbiculare, bullata, apice rotundata, basi rotundata, 1.5 × 1.5, 2 × 2 cm. longa et lata, coriacea, supra glabra, nitida, subtus pilosa, nervo medio et venis primariis supra impressis vel obscuris, nervis primariis 4 vel 5, ad marginem rectis, bifurcatis, non anastomosantibus, venis secondariis subtus dense reticulatis; petiolis teretibus, 3–4 mm. longis, pilosis; inflorescentia terminalis, 2–4 cm. longa, rhachi piloso, bracteis ovatis, 1.5 mm. longis, 1.5–2 mm. latis, pilosis; ochreolis membranaceis, 1 mm. longis, pilosis, pedicellis ochreolas non excedente; floribus masculinis 2 vel 3 per nodulum, hypanthio 0.5 mm. longo, lobis ovatis, 1 mm. longis, 1 mm. latis, staminibus 8, filamentis 0.5–1 mm. longis, pistillo rudimentario; floribus foemineis 1 per nodulum, perianthio masculinis similibus, staminibus rudimentariis, pistillo 1 mm. longo; fructu ovoideo, nigro, glabro, ad 8 mm. longo, 4 mm. diametro, lobis perianthii coronatis, 1 mm. longis.

CUBA: Oriente, Breñales de Playa Vaca, Moa, *Acuña 13094* (SV), *Clemente 4104* (TYPE, G; ISOTYPE, HAB). Collected in flower: Nov. Collected in fruit: July.

This species resembles *C. baracoensis* in having orbicular leaves but can be distinguished by the umbonate character of the leaf blade, the pubescence on the lower surface of the leaf and the glabrous fruits. It also resembles the small leaf forms of *C. geniculata* from which it is distinct on the pubescence of the leaf and the long inflorescence.

8. **Coccoloba caesia** Ekman ex Schmidt, Fedde Repert Sp. Nov. 24: 74. 1927.

Small tree; branches terete, glabrous, nodes not tumid; ochreae membranaceous, 6–8 mm. long, glabrous, turning black on drying; leaf blades elliptical, rarely ovate-elliptical, apex rounded, base narrowed commonly oblique, 9 × 3.5, 13 × 4, 17 × 6.5 cm. long and broad, subcoriaceous, turning black on drying, margin entire, slightly recurved, midrib and veins slightly prominent above, prominent below, primary veins 8–12 pairs, arcuate anastomosing, secondary venation reticulate, conspicuous above, obscured below by club shaped papillae arising from the epidermal cells giving the lamina a gray or ashen appearance; petioles 8–12 mm. long, glabrous, arising from the middle of the ochreae; inflorescence terminal, solitary or with a smaller spike at the base, 12–19 cm. long, rhachis slightly puberulent, staminate flowers in clusters of 2 or 3, pistillate flowers solitary, bracts broadly ovate, less than 0.5 mm. long, puberulent, ochreolae borne on stout puberulent stalks 1–1.5 mm. long in the staminate flowers, 2–3 mm. long in the pistillate flowers, ochreolae membranaceous, puberulent, pedicels not evident, hypanthium less than 0.5 mm. long, the perianth lobes ovate, 1.5 mm. long, filaments of fertile stamens 1.5–1.8 mm. long; fruit obovoid, 8 mm. long, 4–5 mm. broad, narrowed at the base, lobes of the perianth appressed against the apex of the achene.

DISTRIBUTION: Cuba.

CUBA: Oriente: Sierra de Nipe, Loma Mensura, *Ekman 9894* (TYPE, S; ISOTYPES, G, NY); near Rio Piloto, *Ekman 3351* (FM, S), *6420*

(NY, S); Baracoa, Lomas de Cuaba, *Ekman 4237* (S); Sierra Maestra, edge of Arroyo Corojo near Nagua, *Ekman 14739* (FM, NY, S); Loma del Gato, *Clemente 3681* (HAB); Florida Blanca, Santiago de Cuba, *Bucher 231* (NY, R). Collected in flower: May, Oct., Nov. Collected in fruit: Jan.

The stalked ochreolae characterize this species which is also distinct on the gray pubescence of the lower leaf surface. The type specimen is staminate.

9. **Coccoloba pallida** Wr. in Griseb. Cat. Pl. Cub. 61. 1866.

Coccoloba lineari-lanceolata Schmidt, Fedde Repert. Sp. Nov. **24**: 76. 1927.
Uvifera pallida O. Ktze. Rev. Gen. **2**: 561. 1891.

Shrub or small tree to 7 m. tall; branches terete, papillose or puberulent, short shoots conspicuously developed, ochreae membranaceous, 1–2 mm. long, puberulent to pilose; leaf blades ovate to elliptic-ovate, apex rounded or obtusely acuminate, base rounded to obliquely cordate, 4 × 2, 5.5 × 3.5, 6.5 × 2, 9.5 × 6 cm. long and broad, coriaceous, glabrous and pitted above, minutely and densely white papillose below, the hairs short and blunt with rounded apices, midrib and primary veins impressed above, prominent below, primary veins 5–8 pairs, straight or arcuate, bifurcate and anastomosing near the margin, secondary venation densely reticulate on both surfaces; petioles 1–4 mm. long, puberulent attached above the base of the ochreae; leaves of adventitious shoots ovate-lanceolate to lanceolate-oblong, 11 × 3, to 19 × 4 cm. long and broad, petioles 3–4 mm. long, ochreae 3–8 mm. long; inflorescence terminal, 3.5–6.5 cm. long, rhachis puberulent, staminate flowers in clusters of 2–4, pistillate flowers solitary, bracts ovate, less than 0.5 mm. long, puberulent, ochreolae membranaceous, spreading, to 1 mm. long, puberulent; flowering pedicels less than 0.5 mm. long; hypanthium less than 0.5 mm. long, perianth lobes 0.5–1 mm. long and broad, fertile stamens less than 1 mm. long; fruiting pedicels less than 0.5 mm. long; fruit ovoid, to 7 mm. long, 3.5 mm. thick, perianth lobes appressed against the apex of the achene.

DISTRIBUTION: Cuba.

CUBA: Matanzas: Matanzas City, *Ekman 17211* (type Collection of *C. lineari-lanceolata,* S). Havana: Jibacoa beach, *Leon 13248* (G). Pinar del Rio: Cajalbana, *Ekman 10488* (S), *Leon 4945* (NY); San Marcos, *Wright 2254* (type collection, G, HABA, MO, NY, S); Loma Pelada, Cayajabos, *Leon 13221* (NY), *13545* (NY), *13812* (G, HAB, NY). Collected in flower: Dec. Collected in fruit: Jan., Mar. Common names: *Uvero blanco, Uverillo.*

Schmidt's statement that *Coccoloba lineari-lanceolata* is distinct from all other West Indian species of *Coccoloba* is evidence he did not recognize the character of adventitious shoots and the accompanying variation of leaf form that is characteristic of the genus *Coccoloba.* The Ekman collection which is the type of *C. lineari-lanceolata* is of vigorous shoots probably adventitious in nature. Ekman noted on the collector's label that the specimen was rare in Matanzas where he collected it. The char-

acteristic pubescence of *C. pallida* and the striking venation pattern as well as the high attachment of the petiole on the ochreae allow this sterile collection to be placed in *C. pallida*.

10. **Coccoloba coriacea** Sagra, Fl. Cub. 11: 184. 1853; Lindau, Engl. Bot. Jahrb. 13: 153. 1890.

Uvifera coriacea O. Ktze. Rev. Gen. **2:** 561. 1891.
Coccoloba calobotrys Meisner, DC. Prod. **14:** 157. 1856.

Shrub to slender tree 7 m. tall; branches terete, stout, puberulent at the nodes, often of determinate growth (short shoots) with several concentric ochreae at the base, nodes not tumid; ochreae membranaceous, 4–7 mm. long, short pilose pubescent; leaf blades elliptic-lanceolate to oblong-lanceolate, apex acuminate, often with rigid tip, base rounded to cordate, 11 × 4, 13 × 6, 17 × 2.5, 21 × 9 cm. long and broad, coriaceous, glabrous, midrib and veins flat above, conspicuous below, primary veins 5–7 pairs arcuate, bifurcate and anastomosing near the margin, secondary venation minutely reticulate on both surfaces; petioles 5–8 mm. long, puberulent to glabrate; leaves of adventitious shoots 19 × 6, 21 × 9 cm. long and broad; inflorescence terminal, 10–27 cm. long, rhachis papillose to puberulent; staminate flowers commonly single, occasionally in clusters of 2 or 3 flowers, pistillate flowers solitary; bracts ovate, less than 0.5 mm. long, ochreolae membranaceous, 0.5 mm. long; flowering pedicels 7–10 mm. long, glabrous, perianth red, glabrous, hypanthium 1 mm. long, perianth lobes ovate, 2 mm. long, 1.5 mm. broad, fertile stamens 1 mm. long; fruiting pedicels to 15 mm. long, fruit ovoid, acuminate at both ends, to 7 mm. long, 5 mm. thick, perianth lobes sub-coronate.

DISTRIBUTION: Cuba.

CUBA: Oriente: Sierra de Nipe, Piedra Gorda to Woodfred, *Shafer 3543* (NY, US); Rio Canapé, *Ekman 9593* (S); Bio-Trail, *Ekman 4778* (NY, S); Pico Turquino, *Acuña 10075* (SV); Enseñada de Mora, *Britton, Cowell & Shafer 13003* (FM, MO, NY, US); Nagua, Mucural Hill, *Leon 11031* (NY); Rio Yara, *Ekman 14158* (S); *14841* (S); Mayari, *Wright 2258* (G, HABA, MO). Pinar del Rio: Loma de Cajalbana, *Ekman 10487* (NY, S); Cajalbana, *Leon & Charles 4932* (NY). Havana: Vuelta de Abajo, *Sagra 544* (fr.), *290* (fl.) (NY). Collected in flower: Mar., April, July, Aug., Sept.

A specimen collected by Ramon de le Sagra in Havana Province and found in the Meisner herbarium at the New York Botanical Gardens is the type of *Coccoloba calobotrys* Meisner. Two packets are in the corners of this sheet labelled *Sagra 544* (fr) and *Sagra 290* (fl). The specimen according to the label was from the DeCandolle Herbarium and may well be a fragment of the specimen mentioned by Sagra in the original description. *Coccoloba calobotrys* Meisner therefore may well be based on the same specimen as *C. coricea* Sagra. The numbers may have been assigned to the specimens after the publication of the Flora of Cuba.

This species is difficult to distinguish from *C. costata* in sterile condition.

11. **Coccoloba retirensis** sp. nov.

Arbor parva ramulis teretibus, dense ferrugineo-pilosis; ochreis cylindricis, coriaceis, dense ferrugineo-pilosis, 3–5 mm. longis; lamina oblonga vel elliptica, apice acuta, basi rotundata, 5.5 × 2.5, 7 × 3.5, 9 × 4 cm. longa et lata, coriacea, supra glabra, subtus dense pilosa, nervo medio et venis primariis supra inconspicuis, subtus prominentibus, venis primariis 5–7, arcuatis, prope marginem bifurcatis, anastomosantibus, venis secondariis supra et subtus dense reticulatis, margine vix recurvato; petiolis 5–8 mm. longis, pilosis; inflorescentia terminalis, 2.5–3.5 cm. longa, ad basem plures ochreas pilosas gerens, rhachi dense piloso, bracteis ovatis, 0.5 mm. longis, 1 mm. latis, pilosis, ochreolis membranaceis, ad 1 mm. longis, pedicello piloso, 1–1.5 mm. longo; floribus foemineis 1 per nodulum, glabris, hypanthio 0.5 mm. longo, lobis 5, imbricatis, 1.5 mm. longis, 1–1.5 mm. latis, staminibus rudimentariis, ad 1 mm. longis, pistillo 2 mm. longo, stylis 3; floribus masculinis et fructu ignotis.

CUBA: Pinar del Rio, Santa Cruz de los Pinos, Retiro, *Ekman 18614* (TYPE, S).

Collected in flower March 5, 1924. Ekman's collectors label bears the abbreviation "cult." The specimen cited is not referable to any species from the Caribbean, Central or South America now known to me and so I assume the plant may have been under cultivation as a shade tree and is native to Cuba.

12. **Coccoloba tenuifolia** L. Syst. Nat. ed. 10. 1007. 1759, Amoen. 5: 397. 1760; Fawcett and Rendle, Jour. Bot. **51**: 124. 1913.

Coccoloba jamaicensis Lindau, Engl. Bot. Jahrb. **13**: 206. 1890.
Uvifera jamaicensis O. Ktze. Rev. Gen. **2**: 561. 1891.
Coccoloba leptostachyoides Lindau, Engl. Bot. Jahrb. **13**: 207. 1890.
Uvifera leptostachyodes O. Ktze. Rev. Gen. **2**: 561. 1891.
Coccolobis? frutescens etc. Browne, Hist. Jam. 210, *pl. 14, fig. 3*. 1756.
Coccolobis bahamensis Britton, Bull. N. Y. Bot. Gard. **4**: 116. 1905.

Shrub or small tree to 5 m. tall; branches terete, puberulent, becoming short shoots often well developed, nodes slightly tumid; ochreae membranaceous above, coriaceous and persistent below, to 15 mm. long, puberulent; leaf blades elliptical, apex short acuminate, base narrowed, unequally rounded to subcordate, 3.5 × 2, 7 × 4.5, 9.5 × 6, 12 × 10 cm. long and wide, membranaceous, subcoriaceous, glabrous above, finely puberulent below, tomentose in the axils of the primary veins and often extending onto the secondary venation or the blade, midrib and primary veins flat or impressed above, prominent below, primary veins 4 or 5 pairs, arcuate, anastomosing, secondary venation finely reticulate; petioles 6–9 mm. long, persistently puberulent, attached above the enlarged base of the ochreae; inflorescence terminal 8–18 cm. long, weak and pendent, rhachis puberulent; staminate flowers 1–4 in a cluster, pistillate flowers solitary, bracts broadly ovate, less than 0.5 mm. long, puberulent, ochreolae membranaceous about 0.5 mm. long, puberulent; flowering pedicels 1–2 mm. long; hypanthium 0.5–1 mm. long, perianth lobes 1–1.5

mm. long and broad, filaments of fertile stamens 1 mm. long, rudimentary stamens of pistillate flowers less than 0.5 mm. long; fruiting pedicels 1–2 mm. long, fruit ovoid to globose, 5–6 mm. long, 4 mm. thick, perianth lobes appressed to the apex of the achene.

DISTRIBUTION: Jamaica, Cuba, Bahamas. Type from Jamaica.

CUBA: Oriente: S. of Niguero between Rio Nuevo and the coast in limestone based forests. *Ekman 16152* (S).

The specimen collected by Ekman was unidentified in the Stockholm herbarium. Unfortunately it is a sterile specimen collected Jan. 16, 1923. It can be referred without question to this species, previously unreported from Cuba since *C. tenuifolia* is readily identified by the puberulent, membranaceous leaves and the characteristic attachment of the petiole to the ochreae sheath.

Lindau listed *Coccoloba tenuifolia* L. among the uncertain species at the end of his monograph. The specimen in the Linnaean herbarium is an excellent flowering specimen, however, and is readily determinable. Fawcett and Rendle review this situation in Jour. Bot. 51: 124. 1913 and refer *C. jamaicensis* and *C. leptostachyoides* of Lindau to the synonymy of *C. tenuifolia* L.

Coccolobis bahamensis of Britton must likewise be referred to the synonymy of *C. tenuifolia* L. The Bahama material is abundant and while most of the leaves are in the small end of the size range cited in my description above the species does not merit varietal status.

13. **Coccoloba baracoënsis** Schmidt, Fedde Repert. Sp. Nov. 24: 73. 1927.

Small tree; branches terete, ferruginous pilose-pubescent, nodes not tumid; ochreae cylindrical, membranaceous, pilose, 1–3 mm. long, deeply cleft opposite the petiole; leaf blades orbicular, apex rounded, base slightly cordate, 2.5 × 2.5, 4.5 × 4.5, 8.5 × 6.5 cm. long and broad, coriaceous, glabrous, smooth and shining above, minutely reticulate and densely glandular below, margin entire, slightly recurved, midrib and primary veins inconspicuous above, slightly prominent below, primary veins 3–5 pairs, arcuate and becoming reticulate near the margin, not prominently anastomosing; petioles 4–5 mm. long, pilose; inflorescence terminal, 6–14 cm. long, rhachis striate, pilose, staminate flowers not known, pistillate flowers solitary, bracts ovate, 1–1.5 mm. long, pilose, ochreolae membranaceous, flaring, pilose, 1 mm. long, flowering pedicels less than 1 mm. long, perianth pilose, hypanthium less than 1 mm. long, perianth lobes 1.5 mm. long, 1 mm. broad, stamens rudimentary, less than 0.5 mm. long, pistil 1–1.5 mm. long; fruiting pedicels shorter than the ochreolae, fruit globose and crowned by long attenuate perianth lobes, densely pilose, fruit 3 mm. diameter, the perianth lobes 3 mm. long, achene smooth, shining, golden in color.

DISTRIBUTION: Cuba.

CUBA: Oriente: Baracoa, Lomas de Cuaba, *Ekman 4297* (TYPE, S;

ISOTYPE, NY); Sierra Azul, *Ekman 4427a* (S). Collected in flower and fruit in January.

14. **Coccoloba nipensis** Urban, Fedde Repert. Sp. Nov. **13**: 445. 1914.

Coccoloba uviferiella Lundell, Contrib. Univ. Mich. Herb. **6**: 12. 1941.

Shrub to tree, 10 m. tall; branches terete, glabrous, nodes tumid, ochreae membranaceous, tightly cylindrical, 6–8 mm. long; leaf blades orbicular to elliptical, oval or rarely sub-obovate, apex rounded or slightly emarginate, base cordate, rounded or rarely narrowed, 3 × 2, 3 × 3, 4 × 4, 5 × 4 cm. long and wide, coriaceous, glabrous, smooth above and below, densely glandular pitted below; midrib and primary veins flat to obscure above and below, primary veins 4 or 5 pairs, evident only near the midrib, margin entire; petioles 3–8 mm. long, glabrous, tumid at the base; inflorescence terminal 6–9 cm. long, rhachis glabrous, strongly keeled below the bracts and flowers; staminate flowers solitary or in clusters of 2 or 3, pistillate flowers solitary, bracts ovate, less than 0.5 mm. long, ochreolae membranaceous, 0.5 mm. long, glabrous, flowering pedicels 1–2 mm. long, hypanthium less than 0.5 mm. long, perianth lobes 0.5–1 mm. long and broad, fertile stamens less than 1 mm. long; fruiting pedicels to 4 mm. long, divaricate at a sharp angle from the rhachis, fruit oblong, rounded at both ends, to 8 mm. long, 5 mm. thick, perianth lobes appressed against the apex of the achene.

DISTRIBUTION: Cuba.

CUBA: Oriente: Sierra de Nipe, Woodfred, *Shafer 3565* (type Collection, FM, G, MO, NY, US); Rio Piloto, *Ekman 15188* (FM, S), *19168* (S); Sierra de Nipe, *Ekman 9963* (A, NY); Loma Minqura, *Shafer 3815* (FM, MO, NY, US); Rio Joa, Baracoa, *Ekman 3661* (S); Moa, *Mrs. Bucher 44* (NY), *45* (NY), *101* (TYPE of *C. uviferiella*, NY, MICH), *Victorin & Clemente 21712* (G), *Howard 5953* (G), *Mrs. Bucher* without number (SV #11106); Playa de Moa, *Clemente, Chrysogone & Nestor 4327* (G), *Leon & Clemente 23273* (G); Cayo Chico near Moa, *Acuña 13093* (SV). Collected in flower: May, June, July. Collected in fruit: July, Sept.

Lundell describing *C. uviferiella* reports "this species suggests the common sea grape *C. uvifera* to which it is allied." Apparently Lundell overlooked the description of *C. nipensis* published 27 years earlier and the specimens in the New York Botanical Garden cited above. *Coccoloba uviferiella* is a perfect match for *C. nipensis* and the species must be placed in synonymy.

A note in Britton's handwriting in the herbarium in the New York Botanical Garden reports the type specimen of this species to be in Berlin. Since that specimen is presumably destroyed I consider the specimen at NY to be the new type specimen since it is in the best condition of the isotypes cited above.

15. **Coccoloba uvifera** L. Syst. Nat. ed. 10, 1007. 1759.

Polygonum Uvifera L. Sp. Pl. 365. 1753.

Guaiabara Uvifera (L.) House, Am. Midl. Nat. **8**: 64. 1922.

Tree of strand areas, 2–15 m. tall, branches terete, stout, papillose to pilose, nodes not tumid, ochreae rigid coriaceous at the base, membranaceous at the apex, 3–8 mm. long, papillose to pilose; leaf blades orbicular to reniform, apex rounded, truncate or emarginate, base rounded to broadly cordate, one lobe often extending around the petiole, 6 × 8, 11 × 13, 13 × 18 cm. long and broad, thick and fleshy when fresh, coriaceous when dry, glabrous and minutely punctate on both surfaces, midrib and primary veins prominent on both surfaces, frequently brightly colored when fresh, primary veins 3–5 pairs, usually straight, bifurcate and weakly anastomosing near the margin, commonly barbate in the axils of the basal veins, secondary venation minutely reticulate or obscure; petioles stout, 7–10 mm. long, papillose to pilose; leaves of adventitious or fast growing shoots usually variable in size and shape commonly obovate; inflorescence stout, 15–30 cm. long, rhachis puberulent; staminate flowers in clusters of 1–7, pistillate flowers solitary, bracts ovate, 1–1.5 mm. long, 2 mm. broad, puberulent, ochreolae membranaceous, 1 mm. long, puberulent, flowering pedicels 1–2 mm. long, perianth yellow-white or greenish, hypanthium 2–3 mm. long, perianth lobes 4 mm. long, 3–4 mm. wide, fertile stamens to 4 mm. long; fruiting pedicels 3–4 mm. long, fruit obpyriform, 1.2–2 cm. long, 8–10 mm. diameter, narrowed at the base, rounded truncate at the apex, the perianth lobes appressed against the apex of the achene, perianth rose-purple when mature, the achene black.

DISTRIBUTION: Along shores, Florida, Bermuda, through the Caribbean to S. America.

CUBA: Oriente: Gibara to Punta Hicacos, *Shafer 1485* (US, NY); Santiago, *Taylor 324* (NY). Las Villas: Soledad, *Jack 585* (A), *4118* (A), *4533* (A), *5092* (A), *5319* (A); Rancho Luna, E. of Cienfuegos Bay, *Howard 4209* (G); Castillo de Jagua, *Combs 569* (G, FM, MO, NY). Havana: *Liebmann* without number (C, several sheets); Morro Cojimar, *Ekman 372* (S); Playa de Marianao, *Palmer & Riley 852* (US); Rancho Bayeros, *Wilson 1339* (C); Santiago las Vegas, *A. L. & H. N. Moldenke 19915* (NY); Playa Mariano, *Van Hermann 887* (NY). Camagucy: Cayo Sabinal, *Shafer 1125* (US, NY). Isle of Pines: Nueva Gerona, *Curtis* without no. (NY). Without locality: *Wright 2259* (G). Collected in flower: Mar., April, Aug., Sept. Collected in fruit: June, July, Aug. Common names: *uva, uva de la caleta, uvero, uva de playa.*

15a. **Coccoloba uvifera L. × C. diversifolia** Jacq., hybr. nov.

Shrub or tree; branches terete, minutely pilose; ochreae coriaceous, persistent, oblique and flaring at the apex, pilose; leaf blades oblong to obovate-oblong, apex rounded to sub-acute, base obliquely rounded to obliquely cordate, 11 × 8, 14 × 9.5, 16 × 10.5 cm. long and broad, coriaceous, midrib and primary veins prominent on both surfaces, secondary venation conspicuously reticulate both surfaces, primary veins 5–7 pairs, arcuate, anastomosing, leaf blade glabrous above, crispose pilose on midrib and veins below and in axils of veins and on lamina parallel to midrib, densely resinous glandular below; petiole stout, 1–1.5 cm. long,

minutely pilose; inflorescence terminal 7–15 cm. long, rhachis puberulent, bracts broadly ovate 1 mm. long, puberulent, ochreolae membranaceous, 1 mm. long, puberulent, flowering pedicels 1.5–2 mm. long, puberulent; staminate flowers in clusters of 2–3, hypanthium 0.5 mm. long, perianth lobes 0.5–1 mm. long, stamens 1 mm. long; pistillate flowers not seen; fruiting pedicels 2–4 mm. long, fruits not seen.

CUBA: Pinar del Rio: Sta. Cruz de Los Pinos, *Ekman 18615* (S), Range, *Roig 11935* (SV).

In the nature of the pubescence, the texture of the leaves and the pattern of primary venation this material approaches *C. uvifera*. The secondary venation and the type of glands found on the leaves are similar to those of *C. diversifolia*. The shape of the leaf blade is intermediate between these two species. *Coccoloba uvifera* apparently hybridizes freely with many other species of the same genus. Unfortunately single collections in the herbarium are usually of little value in the study of possible hybridization and field studies are needed with just this idea in mind.

16. **Coccoloba Northropiae** Britton, Bahama Flora 117. 1920, (as *Coccolobis*).

Coccoloba leoganensis var. *parvifolia* Griseb. Cat. Pl. Cub. 61. 1866.
Coccoloba retusa Lindau, Engl. Bot. Jahrb. **13**: 150. 1890, in part.

Shrub or small tree to 4 m. tall; branches terete, pilose becoming glabrate, nodes slightly tumid; ochreae membranaceous, 2–3 mm. long, glabrous; leaf blades orbicular to obovate or elliptic, apex rounded, obtuse or emarginate, base narrowed, 3 × 2.5, 4 × 3 cm. long and wide, thinly coriaceous, glabrous, turning black on drying, commonly shining above, dull beneath, midrib and primary veins equally prominent on both surfaces, secondary venation reticulate, primary veins 4–6 pairs, straight, diffuse branching and becoming reticulate near the margin, not arcuate and anastomosing, margin entire, flat; petioles 3–5 mm. long, short pilose pubescent; leaves of adventitious shoots variable in shape, 5 × 3, 6 × 4 cm. long and wide on petioles to 7 mm. long; inflorescence terminal 5–7 cm. long, rhachis puberulent, the female more so than the male, bracts ovate, less than 0.5 mm. long, ochreolae membranaceous, less than 0.5 mm. long; male flowers in clusters of 2, female flowers solitary, flowering pedicels 0.5–1 mm. long, hypanthium 1 mm. long, perianth lobes 1 mm. long and wide, fertile stamens less than 1 mm. long, stamens of pistillate flowers rudimentary, less than 0.5 mm. long; fruiting pedicels 1.5 mm. long, fruit ovoid, to 5 mm. long, 3 mm. thick, perianth lobes appressed against the apex of the achene.

DISTRIBUTION: Cuba, Bahamas. (Type collection, *Curtis* without number from New Providence, Bahamas).

CUBA: Oriente: Santiago de Cuba, *Ekman 19206* (S); San German, *Ekman 6346* (S); Loma Estrella, Sierra de Nipe, *Ekman 6392* (S). Pinar del Rio: Morillo, *Ekman 17376* (S); Viñales, Sierra de Viñales, *Ekman 18037* (NY, S); Sierra de Pendejeral, groupa del Rosario; Sierra de Organos, *Ekman 17525* (S). Without location: *Wright 2251* (G,

HABA, MO, S). Collected in flower: Mar., May, June, July. Collected in fruit: Sept. Local name: *uverillo*.

Both Lindau and Grisebach have misinterpreted *C. retusa* by including *Wright 2251* in that species. The puberulence of the plant and the character of the venation of the leaves make this Wright specimen, and the other specimens cited above, clearly distinct from *C. retusa*. This represents the first report of *C. Northropiae* from Cuba.

17. **Coccoloba retusa** Griseb., Cat. Pl. Cub. 61. 1866; Lindau, Engl. Bot. Jahrb. **13**: 150. 1890, in part.

Uvifera retusa O. Ktze. Rev. Gen. **2**: 562. 1891.

Coccoloba retusa forma *acuminata* Lindau, Engl. Bot. Jahrb. **13**: 151. 1890.

Coccolobis colomensis Britton, Bull. Torrey Bot. Club **42**: 369. 1915.

Shrub 1–2 m. to tree 17 m. tall; branches terete, glabrous, nodes slightly tumid, ochreae membranaceous, 5–9 mm. long, glabrous; leaf blades ovate, oblong, elliptic or obovate, apex acute, rounded or emarginate, rarely acuminate, base narrowed, rounded or subcordate, commonly unequal, 3.5 × 2.5, 7 × 5.5, 10 × 4 cm. long and broad, coriaceous, glabrous, shining above, turning black on drying, midrib and primary veins prominent on both surfaces, primary veins 4–7 pairs, straight towards the margin bifurcating and anastomosing near the margin, secondary venation reticulate, conspicuous both surfaces, margin entire or undulate; petioles 6–10 mm. long, glabrous; inflorescence terminal, 4–14 cm. long, rhachis glabrous, staminate flowers solitary or in clusters of 2–4, pistillate flowers solitary, bracts ovate, less than 0.5 mm. long, ochreolae membranaceous less than 0.5 mm. long, flowering pedicels developing after the flower opens, i.e. flowers sessile at the apex of the inflorescence, or on pedicels 0.5 mm. long near the base, hypanthium 0.5 mm. long, perianth lobes 0.5–0.7 mm. long and broad; fertile stamens less than 1 mm. long; fruiting pedicels 0.5–1 mm. long, fruit ovoid, rounded at the base, to 6 mm. long, 3 mm. thick, perianth lobes coronate.

DISTRIBUTION: Cuba.

CUBA: Oriente: Loma del Gato, *Leon, Clemente & Roca 10269* (NY), *Leon 12363* (NY), *Acuña 9820* (SV), *Crisostomo 3329* (G); Sierra de Nipe, Rio Jimbambay, *Ekman 15138* (G, S); Rio Piloto, *Ekman 4748* (A, NY, S), *5014* (S), *5794* (NY, S), *6415* (FM, MICH, S), *6691* (A, S), *9767* (NY, S), *9790* (MO, S); Rio Piedra, *Ekman 9817* (NY, S); Nagua on Rio Yara, *Ekman 14840* (A, FM, NY, S, US); Cayo del Rey, *Ekman 4793* (S); Papayo near Sevilla, *Ekman 9462* (A, FM, G, MO, NY, S, US); Bayate near Cauto, *Ekman 6192* (MICH, S); Arroyo del Cristo, S. of Nagua, *Ekman 14754* (FM, NY, S); Charco Largo, Punta Padre, *Curbelo 281* (NY); Bayate near Arroyo Piedra, *Ekman 4668* (S); Manacal, Sierra Maestra, *Ekman 9358* (MICH, S); El Paraiso, Holguin, *Ekman 7607* (S); Santiago, *Clemente 4242* (HAB); Mucural Hill, near Nagua, *Leon 11034* (NY); Rio Seboruco to falls of Rio Mayari, *Shafer 3688* (G, NY, US); Jagueyes de Mulas, *Roig 14* (NY); Facallores, *Wright 1668* (type Collection of *C. retusa* f. *acuminata*, G), *Wright 2252* (G, HABA,

MO, NY, S, type Collection *C. retusa*, see discussion). Las Villas: Cieneguita, *Combs 374* (FM, G, MO, NY); Savana de Motembo, *Leon, Fortún & Ednund 8568* (NY); Cayo Ramones, Jucaro Quemado, Peninsula de Zapata, *Roig & Cremata 2255* (FM); Sabana de Manacas, Laguna Asiento Viejo, *Leon 9283* (NY); Central Australia, Peninsula Zapata, *Ekman 18328* (S); Lomas de Banao, *Luna 110* (NY); El Porvenir to Aguacate, *Britton & Wilson 5361* (NY); Mina Carlotta, Sierra de San Juan, *Howard 5628* (G), *5661* (G). Havana: Loma de la Pita, San Miquel, *Leon, Ekman, Johnston, & Roig 9101* (NY), *Leon 11529* (NY); Loma de Neponuiceno, San Miquel de Casanova, *Leon 11601* (NY); Campo Florida at Rio Quezada, *Ekman 13237* (A, FM, NY, S, US). Pinar del Rio: Loma Pelada, Cayajabos, *Leon & Roig, 13538* (NY), *13539* (NY), *Leon 13205* (NY); Çoloma, *Britton, Britton & Gager 7037* (NY, US, type Collection of *C. colomensis*), *Ekman 17828* (NY, S), *Britton & Cowell 9848* (G, NY, US); Sabalo, Rio Sabalo, *Ekman 11447* (NY, S); Savannas SE of Los Palacios, *Leon & Roca 7368* (NY); Los Palacios to San Juan de Zayas, *Shafer 1813* (NY); Rio Blanco, *Ekman 17294* (S). Isle of Pines: Rio Las Casas, Nueva Gerona, *Ekman 12005* (S), *12010* (S); Manati, *Blain 185* (FM); Los Indios, *Britton, Britton & Wilson 14243* (NY); Coe's Camp, Enseñada de Siguanea, *Britton & Wilson 14846* (NY, US); Mal Pais to La Ceiba, *Ekman 11915* (S); San Juan, *Roig & Cremata 1783* (NY). Locality Unspecified: Herb. Sauvalle *2173* (HABA). Collected in flower: Feb., Mar., June, July, Aug., Sept., Oct., Dec. Collected in fruit: Jan., Feb., Sept., Oct., Nov., Dec. Local names: *uverillo, Cocuyo de la maestra.*

The numerous collections of *Coccoloba retusa* cited above show a tremendous range of variation in the size and shape of the leaves. Lindau described one form for the species but since this is just a small part of the normal variation of leaf shape it is not recognized as valid in this treatment.

Coccolobis colomensis which Britton based on a Britton & Gager specimen from Pinar del Rio is also separated by Britton on characters found in the shape of the leaf. Leaf shape is an unstable base for specific distinction in this genus and I am reducing Britton's species to synonymy of *C. retusa.*

The type collection of *Coccoloba retusa* is *Wright 2252.* I have seen six examples of this collection as cited above but in the packets attached to the sheets of the Gray Herbarium collection are a variety of notes regarding the location where the collection was made. These are "Monte Verde Sept. 7," "Potosi, Monte Yow, Oriente, Oct. 10," "Retin, Oct. 19." Thus the collection seems to be mixture. All of the material distributed under the number *Wright 2252* however is referable to *C. retusa.*

18. **Coccoloba praecox** Wright ex Lindau, Engl. Bot. Jahrb. **13**: 142. 1890.

Uvifera praecox O. Ktze. Rev. Gen. **2**: 562. 1891.
Coccoloba Ekmani Urban, Fedde Repert. Sp. Nov. **14**: 331. 1916.

Shrub to tree 9 m. tall; branches terete, nodes tumid, twigs puberulent when young becoming glabrate; ochreae membranaceous, puberulous, 4–6

mm. long; leaf blades ovate to oblong-ovate, apex acute with a mucro or rounded, occasionally slightly emarginate, base rounded to sub-cordate, 3 × 2.5, 4.5 × 3.5, 5 × 4.5 cm. long and broad, thin coriaceous to chartaceous, glabrous, upper surface smooth or minutely reticulate, lower surface minutely reticulate, midrib impressed above, slightly prominent below, puberulent, primary veins 5–7 pairs, inconspicuous, arcuate anastomosing near the margin, margin entire with a prominent edge, flat; petioles 4–8 mm. long, puberulent; leaves of adventitious shoots, ovate-oblong, rounded or emarginate at the apex, 5 × 5.5 cm. to 6.5 × 4.5 cm. long and broad; inflorescence terminal 2–9 cm. long, rhachis puberulent, staminate flowers solitary or in clusters of 2 or 3, pistillate flowers solitary, bracts ovate less than 0.5 mm. long, puberulent, ochreolae less than 1 mm. long, flowering pedicels 0.5–1 mm. long, hypanthium 0.5 mm. long, perianth lobes 1–1.5 mm. long, fertile stamens with filaments 1–1.5 mm. long; fruiting pedicels 1–1.5 mm. long, fruit ovoid, 4 mm. long, 2.5 mm. thick, perianth lobes sub-coronate.

DISTRIBUTION: Cuba.

CUBA: Oriente: Charco, *Wright 2253* (type Collection, G, HABA, MO, NY, S); Punta Padre, *Curbelo 74* (HAB, NY), *Roig 5537* (NY); Mir, between Victoria de las Tunas and Holguin, *Ekman 7541* (MO, S); Anafe, near Caimito del Guayabal, *Ekman 188* (S). Camaguey: Camaguey City, *Britton, Britton & Cowell 13115* (NY, US); Sabana de la Caridad, Cespedes, *Roig, Luaces & Aranjo 910* (NY); Santayana, *Ekman 19036* (S); Savana de Providencia, *Roig 8209* (NY). Las Villas: Mordazo, *Leon 9232* (NY), *Leon & Cazañas 5929* (NY); Casilda, *Ekman 18879* (S). Matanzas: Cuabal del Espinal, Canasí region, *Leon & Roig 13354* (HAB, NY), *13355* (NY), *Acuña 11290* (SV); Pan de Matanzas, *Ekman 16510* (S). Havana: Cuabal de Salomon, Minas, *Leon 13787* (NY), *13887* (NY); Cuabal de Jesús María, Minas, *Leon 13334* (NY), *13335* (NY); Madruga, *Leon & Cesàire 8940* (NY); Lomas de Jatas, Guanabacoa, *Ekman 580* (type Collection of *C. Ekmani*, FM, S), *10905* (S), *16532a* (S), *16532b* (NY, S), *Leon 7342* (NY, HAB); Loma Coca near Campo Florida, *Ekman 13220* (S), *16437a* (S), *16437b* (A, S), *19005* (A, FM, MO, NY, S, US). Pinar del Rio: Mayari, S. of San Cristobal, *Fors 4790* (NY). Collected in flower: Apr., May. Collected in fruit: Apr., May.

The type collection of *C. Ekmani*, (*Ekman 580*) was considered distinct on the ovate to suborbicular leaves however these minor variations in shape can be matched in many leaves of the original Wright collection. *Coccoloba Ekmani* is not a valid species.

19. **Coccoloba Shaferi** Britton, Bull. Torrey Bot. Club **42**: 369. 1915, (as *Coccolobis*).

Coccoloba azulensis Schmidt, Fedde Repert. Sp. Nov. **24**: 73. 1927.

Shrub or tree to 7 m. tall; branches terete, puberulent or papillose, contorted, short shoots, commonly developed with concentric ochreae, ochreae 7–9 mm. long, membranaceous, puberulent; leaf blades ovate to ovate-elliptic, rarely lanceolate-ovate, apex obtusely acuminate to rounded,

base cordate, 5 × 3, 7 × 5.5, 9 × 6, 14 × 9 cm. long and wide, coriaceous, glabrous, dull both surfaces, midrib and primary veins slightly impressed above, prominent below, primary veins 5–7 pairs, straight to the margins, not arcuate nor anastomosing or rarely bifurcating close to the margin and reticulate, blades densely pitted on both surfaces, secondary venation reticulate slightly conspicuous both surfaces, margin entire, slightly revolute, petioles 7–10 mm. long, glabrous; leaves of vigorous or adventitious shoots lanceolate-ovate, apex acuminate, 12 × 3 to 14 × 4.5 cm. long and wide; inflorescence terminal 10–25 cm. long, rhachis, bracts, ochreolae and perianth papillose or puberulent, flowering pedicels shorter than the ochreolae, staminate flowers in clusters of 2–4 flowers, rarely solitary, pistillate flowers solitary, bracts ovate, 2 mm. long, ochreolae membranaceous, 2–3 mm. long, perianth red, hypanthium 2–3 mm. long, perianth lobes oblong, 3 mm. long, 2 mm. broad, fertile stamens 2 mm. long; fertile pistil 4 mm. long; fruit not known.

DISTRIBUTION: Cuba.

CUBA: Oriente: near mouth of Rio Yamaniguey, *Shafer 4252* (NY); Camp Toa to Camp La Barga, Northern Oriente, *Shafer 4165* (TYPE, NY); Sierra de Moa, *Ekman 4511* (S), *Bucher 104* (NY), *104a* (NY), *Shafer 8351* (NY), *Howard 6050* (G); Monte de la Brena, Sierra de Moa, *Leon, Clemente & Alain 22567* (G), *22582* (G), *Clemente & Crisostomo 4966* (G); Sierra Azul, *Ekman 4427b* (type collection of *C. azulensis,* S); Narave at Baracoa, *Ekman 4054* (NY, S). Collected in flower: Jan., Feb., Mar., Apr., July, Aug., Sept., Dec.

Following the original description of *C. azulensis* Schmidt reports his new species to be similar to *C. Shaferi* but differing in the longer inflorescence and the glabrous inflorescence rhachis. Apparently this comparison was made with the original description of *C. Shaferi* for the specimens of *C. Shaferi* cited above have inflorescences 10–20 cm. long instead of the 12 cm. originally reported by Britton. The pubescence of the inflorescence rhachis, bracts, ochreolae and perianths varies considerably from small protuberances of epidermal cells called a papillose puberulence to short pilose hairs. In all characters the Ekman specimen selected as the type of *C. azulensis* seems to grade into the larger collection of *C. Shaferi* and may be regarded as an extreme of variation. I have therefore reduced Schmidt's species to the synonymy of *C. Shaferi.*

20. **Coccoloba costata** Wr. ex Sauvalle, Fl. Cub. 139. 1868; Lindau, Engl. Bot. Jahrb. **13**: 155. 1891; Schmidt, Fedde Repert. Sp. Nov. **27**: 105. 1929.

Uvifera costata O. Ktze. Rev. Gen. **2**: 561. 1891.

Coccoloba leoganensis var. *cordata* Griseb. Cat. Pl. Cub. 61. 1866.

Tree; branches stout, pubescent with a ferrugineous to golden pubescence; ochreae membranaceous, 4–6 mm. long, ferrugineous puberulent; leaf blades ovate to elliptic, apex obtuse, acute or obtusely acuminate, base obliquely cordate, 7 × 5, 13 × 8, 18 × 12, 24 × 15 cm. long and broad, coriaceous, golden shining above, dull brown below, midrib and

veins impressed above, prominent below, primary veins 5–7 pairs, arcuate, anastomosing, blade pitted, glandular above and below, glabrous; petiole stout, 8–10 mm. long, slightly puberulent; leaves of adventitious shoots to 35 × 22 cm. long and broad, petioles 1.5 cm. long; inflorescence terminal, rhachis puberulent, 15–20 cm. long, staminate flowers in clusters of 2–4, pistillate solitary, bracts ovate, 0.5 mm. long, ochreolae membranaceous, 0.5 mm. long, flowering pedicels 0.5 mm. long, hypanthium 0.5 mm. long, perianth lobes 0.5–1 mm. long and broad, fertile stamens 1 mm. long; fruiting pedicels to 1.5 mm. long, fruit globose, to 6 mm. long, 3 mm. thick, perianth lobes coronate.

DISTRIBUTION: Cuba.

CUBA: Oriente: Monte Verde, *Wright 1393* (G, HABA, MO, S, type Collection); Sierra de Nipe, Rio Piloto, *Ekman 2725* (FM, NY, S); Piedra Gorda to Woodfred, *Shafer 3084* (FM, G, NY, US); Arroyo del Medio, *Ekman 15243* (A, S); Loma Mensura *Ekman 3205* (S); Baracoa, Lomas de Cuaba, *Ekman 4229* (S); Moa, *Leon, Clemente & Alain 22518* (G), *Clemente 4360* (G); Punta Gorda, Sierra de Moa, *Clemente 4053* (G); Alta Loma Naranja, *Bucher* without number (SV #10099). Collected in flower: Jan., June. Collected in fruit: Aug., Oct. Common name: *uvilla*.

21. **Coccoloba benitensis** Britton, Bull. Torrey Bot. Club **42:** 370. 1915, (as *Coccolobis*).

Coccolobis monticola Britton, Bull. Torrey Bot. Club **50:** 37. 1923.
Coccolobis brevipes Britton, Bull. Torrey Bot. Club **42:** 371. 1915.

Shrub or small tree; branches terete, densely puberulent, commonly branching in one plane, nodes slightly tumid; ochreae 3–4 mm. long, membranaceous, densely ferrugineous pilose; leaf blades ovate to ovate-elliptic, apex acute to acuminate, base narrowed or rounded, 2 × 1, 4 × 2, 6.5 × 3.5, 7.5 × 3 cm. long and wide, coriaceous, glabrous and pitted above, coarsely reticulate and glabrous below but densely to sparingly covered with peltate resinous exudate, margin entire, slightly recurved, midrib impressed above, slightly keeled when dry, primary veins 3 or 4 pairs, prominent both surfaces, secondary venation reticulate, conspicuous both surfaces; petioles 2–4 mm. long, flattened above, ferrugineous pilose on the upper surface, commonly covered with peltate resinous exudate below; leaves of adventitious shoots with ochreae 9–12 mm. long, blades to 10.5 × 5 cm. long and wide, petioles to 8 mm. long; inflorescence terminal or terminal on short shoots, 2–3 cm. long, several concentric ochreolae at the base, rhachis puberulent or with glandular exudate, bracts minute, less than 0.5 mm. long, ochreolae minute, less than 0.5 mm. long, flowering pedicels less than 1 mm. long; staminate flowers in clusters of 2 or 3, pistillate flowers solitary, hypanthium 1 mm. long, lobes 0.5 mm. long, filaments of staminate flowers 1 mm. long, in pistillate flowers 0.1 mm. long, rudimentary pistil in male flower 0.3 mm. long, pistil in female flowers to 3 mm. long; fruiting pedicels 1–1.5 mm. long, fruit ovoid to globose, 6 mm. long, 4 mm. thick, perianth lobes appressed at the apex of the achene, perianth of fruit commonly with glandular exudate.

DISTRIBUTION: Cuba.

CUBA: Oriente: Camp San Benito, *Shafer 4049* (TYPE, NY), *4044* (FM, NY, US); Sierra de Moa, Camp la Gloria, *Shafer 8230* (NY, US); Sierra Maestra, Arroyo Jiménez, *Ekman 14802* (NY, S); Rio Yara and Rio Palmamocha, *Ekman 14331* (US, S), *14389* (A, FM, S); Pico Turquino, *Leon 10713* (type of *C. monticola,* NY), *Leon 10902* (NY); Sierra Maestra, Estribo Cardero, *Roig, Acuña & Bucher 6590* (NY); Arroyo Veinticinco *Wright 2257* (type Collection of *C. brevipes,* G, HABA, MO, NY). Collected in flower: July, Aug. Collected in fruit: Aug.

Britton failed to recognize the various patterns of growth found in specimens of *Coccoloba.* The presence of short shoots, vigorous growth, and adventitious shoots each with very different aspects and sizes of leaves, petioles and ochreae has led to numerous duplication of species descriptions. *Coccoloba benitensis* was chosen as the type and name of this group because the shoots are near the normal to be expected for the species and because the specimens have female flowers and fruit. The type specimen of *C. brevipes* Britton is described by Wright in field notes as a subscandent bush. This I judge to be vigorous shoots and the larger internodes, leaves, petioles and ochreae support this view. On the other hand the material of *C. monticola* is from a specimen which appears stunted but which possesses short shoots and has small internodes, leaves, etc. Britton was impressed with the peltate "black dots" on the lower leaf surface which are actually glandular excretions. These may be present on the upper or lower leaf surface of all specimens as well as on the rhachis of the inflorescence and on the perianth and the fruit. The amount of resinous exudate is frequently impressive.

22. **Coccoloba rufescens** Wr. ex Lindau, Engl. Bot. Jahrb. **13**: 143. 1890.

Uvifera rufescens O. Ktze. Rev. Gen. **2**: 562. 1891.
Coccoloba rufescens Wr. forma *longifolia* Lindau, l.c. **13**: 143. 1890.
Coccoloba punctata var. *parvifolia* Griseb. Pl. Wright. 175. 1860.

Shrub or small tree, 2–4 m. tall; branches terete, nodes slightly tumid, youngest branches ferrugineous pilose; ochreae cylindrical, 3–4 mm. long, cleft almost to the base, pilose; leaf blades ovate, elliptic or oblong-ovate, apex acute to acuminate, base narrowed, rounded, often oblique, 5 × 2.5, 7.5 × 3, 9 × 4 cm. long and broad, coriaceous, smooth above, usually shining, midrib and primary veins sub-prominent below, secondary venation obscure, lamina densely and minutely glandular punctate below; petioles 3–5 mm. long, pilose; inflorescence terminal, 2–6 cm. long, rhachis pubescent; staminate flowers unknown; pistillate flowers solitary, bracts broadly ovate, less than 1 mm. high, 2 mm. broad, pilose, ochreolae membranaceous 0.5 mm. long, strongly bilobed, pilose, pedicels shorter than the ochreolae, perianth white, glabrous, hypanthium 1–1.5 mm. long, lobes ovate, 1–1.5 mm. long, stamens rudimentary, pistil oblong triangular; fruit globose, 5 × 4 mm., slightly narrowed at apex and the base, perianth lobes coronate, 1.5–2 mm. long.

DISTRIBUTION: Cuba.

CUBA: Oriente: Mt. Verde, *Wright 462* (type Collection, FM, G, MO, NY, S), *Wright 1394* (FM, G, HABA, MO, NY, S); Baracoa, Lomas de Cuaba, *Ekman 4220* (NY, S); Montes de la Breña, Moa, *Acuña 13090* (SV), *Acuña 13092* (SV); Camp Toro to Camp La Barga, *Shafer 4152* (NY); Cayoquán, *Victorin & Clemente 21519* (HAB); Sierra de Nipe, *Bucher* without no. (SV #11493). Without location: *Wright 462a* (G). Collected in flower: Feb., Apr. Common name: *uvero de costa.*

23. **Coccoloba Wrightii** Lindau, Engl. Bot. Jahrb. **13**: 151. 1890; Schmidt, Fedde Repert. Sp. Nov. **24**: 27. 1927.

Uvifera Wrightii O. Ktze. Rev. Gen. **2**: 562. 1891.

Coccolobis saxicola Britton, Bull. Torrey Bot. Club **50**: 37. 1923.

Shrub or small tree, to 3 m. tall; branches terete, glabrous, ochreae membranaceous, 4–6 mm. long, puberulent to tomentose; leaf blades ovate, elliptic, obovate or rarely ovate lanceolate, apex acute to abruptly short-acuminate, base narrowed to obtuse, usually slightly oblique, 5 × 2.5, 8 × 4, 10 × 7, 11 × 10 cm. long and broad, coriaceous, young leaves often shining above, mature leaves generally dull both surfaces, midrib and primary veins impressed above, the lamina commonly umbonate between the veins, primary veins 4–6 pairs, prominent below, arcuate, anastomosing near the margin, secondary venation reticulate, conspicuous on both surfaces, leaves glandular below, margin entire, slightly recurved; petioles 4–7 mm. long, papillose to puberulent; leaves of adventitious shoots to 20 × 17 cm. long and broad, petioles 2.5 cm. long, ochreae to 2 cm. long; inflorescence terminal, 3–10 cm. long, rhachis papillose with glandular excretions, staminate flowers in clusters of 2–5, pistillate flowers solitary, bracts ovate, 0.5 mm. long, ochreolae membranaceous 1 mm. long, papillose or glandular, flowering pedicels 1 mm. long, perianth greenish white, hypanthium 1 mm. long, perianth lobes 1–1.5 mm. long and broad, fertile stamens with filaments united below into a tube 1 mm. long, free portion of filaments 0.5 mm. long; fruiting pedicels 1–3 mm. long, fruit ovoid, slightly contracted at the base, rounded at the apex, 7–9 mm. long, 4–5 mm. diameter, perianth lobes slightly coronate.

DISTRIBUTION: Cuba.

CUBA: Oriente: Sierra Cristal, at Rio Lebisa, *Ekman 6864* (NY, S); Sierra de Imías, crest of Punton del Maté, *Leon 12280* (G, NY); Manacal, Sierra Maestra, *Ekman 9378* (A, NY, S); Cueva del Aura, Sierra Maestra, *Roig & Bucher 6688* (NY), *Bucher 171* (R, HAB); Loma del Gato, *Bucher 259* (NY), *Leon, Clemente & Roca 10167* (type Collection of *C. saxicola*, NY); Pico Turquino, Sierra Maestra, *Acuña 7671* (R); Maestra Range, *Leon 10712* (NY, R); Alto Loma del Naranjo, Baracoa, *Bucher* (R #1033, SV); Arroyo Jiménez, Sierra Maestra, *Ekman 14785* (NY, S); Hongolosongo, Loma del Gato, *Clemente 1815* (NY); Rio Yara and Rio Palmamocha divide, Sierra Maestra, *Ekman 14386* (S); Loma Mensura, Sierra de Nipe, *Ekman 9922* (NY, S); Monte Real, Sierra del Cobre, *Ekman 7863* (S); Valley of Rio Yaminiguey, *Shafer 4229* (NY, US); Monte de la Breña, Sierra de Moa, *Leon, Clemente & Nestor 23325* (G); Punta Gorda, Sierra

de Moa, *Clemente 4038* (G); Monte Grande de Centeno, *Leon, Clemente & Alain 22664* (G); Charrascal del Coco, Sierra de Moa, *Leon, Alain & Chrysogone 22631* (G); La Guinea, *Wright 1395* (FM, G, MO, NY, type Collection). Las Villas: Lomas de Banao, *Luna 468* (NY); El Purial and Los Guineos, Lomas del Banao, *Ekman 16235* (S); Pico Potrerillo, Trinidad Mts., *Ekman 18947* (S). Collected in flower: June, July, Aug. Collected in fruit: Jan., Mar., July, Aug., Oct.

This is a species of mountain areas, collected from 700–1100 meters altitude. Lindau described the type collection of *Wright 1395* as flowering in June. The Wright material cited above which I have seen was collected Dec. 17, 1859 according to the label attached and the material is in fruit. Apparently this is another mixture of Wright labels.

24. **Coccoloba Leonardii**, sp. nov.

Arbor ad 10 m., ramulis teretibus, glabris, nodis vix tumescentibus, ochreis subcoriaceis, glabris, 3 mm. longis; lamina ovata, apice rotundata vel acuta, basi rotundata vel subcordata, lateribus inaequalibus, in petiolum subdecurrente, 6.5 × 4, 8 × 5.5, 11 × 7 cm. longa et lata, coriacea, glabra, supra cineracea, subtus brunnea, nervo medio et nervis primariis supra et subtus prominentibus, nervis primariis 5–7, arcuatis, anastomosantibus, venis secondariis reticulatis; petiolis 8–11 mm. longis, supra late canaliculatis, glabris; inflorescentia terminalis, 5.5–14 cm. longa, rhachi glabra, bracteis ovatis, 0.5–1 mm. longis, ochreolis membranaceis, 1 mm. longis, pedicello ochreolas non excedente; floribus masculinis 2–4 per nodulum, hypanthio 0.5 mm. longo, lobis 1.5 mm. longis et latis, filamentis ad 1 mm. longis, pistillo rudimentario circa 0.5 mm. longo, floribus foemineis perianthio masculinis similibus, staminibus rudimentariis, pistillo 1–1.5 mm. longo; fructu late fusiformi, 10 × 5, 11 × 7 mm. longo et diametro, supra nigro, subtus brunneo, lobis perianthii subcoronato, 1 mm. longo.

DISTRIBUTION: Haiti, Cuba.

HAITI: Tortue Island: Tableland N.E. of Basse Terre, 30′ tree in dry thickets in rocky ravines, *E. C. & G. M. Leonard 12466* (TYPE, A; ISOTYPES, MO, NY, US); La Vallée, *E. C. & G. M. Leonard 11335* (MICH, US), *11381* (A, G, K, US), *11421* (NY, US), *11423* (G, US); Pte. Petite Bois, *Ekman 4150* (S). Navassa Island: West of the lighthouse, *Ekman 10843* (S, US). Dept. du Nord: Morne la Vigie, Cap Haitien, *Ekman 2706* (S, US); Bayeux, *Nash 293* (FM, NY). Dept. du Nord-Ouest: Saline Michel near Port au Paix, *Ekman 3931* (S).

CUBA: Oriente: Bayate, between Rio Bayate and Arroyo Bibano, *Ekman 9003* (S), *9622* (S).

A new species readily distinct by the fusiform bicolorus fruit from others of the Antilles with sessile flowers and fruits.

This species is named in honor of its collector, E. C. Leonard of the Smithsonian Institution in Washington, D. C. who has a continuing interest in the flora of Hispaniola.

The two collections made by Ekman in the Oriente province of Cuba are both sterile adventitious shoots but they can be referred to this species

without question on the venation and glandular characters of the leaf blades.

25. **Coccoloba Swartzii** Meisner, DC. Prod. **14**: 159. 1856.

Coccoloba neglecta Fawcett & Rendle, Jour. Bot. **51**: 124. 1913.
Uvifera Swartzii O. Ktze. Rev. Gen. **2**: 562. 1891.

Tree 8–20 m. tall; branches terete, glabrous, nodes slightly tumid; ochreae 10–12 mm. long, basal portion 3–5 mm. long, coriaceous, persistent, upper portion 5–7 mm. long, membranaceous, deciduous; leaf blades ovate to elliptic, apex acute, base narrowed, rounded or slightly cordate, 7 × 5, 11 × 9, 15 × 7.5 cm. long and broad, coriaceous, usually turning black on drying, glabrous, pit-like depressions on the upper surface, small glands on the lower surface, midrib and veins inconspicuous or flat above, prominent below, primary veins 6 or 7 pairs, arcuate anastomosing, secondary venation conspicuous, reticulate; petioles 10–18 mm. long, glabrous, attached at the base of the ochreae; inflorescence terminal, 10–15 cm. long, rhachis glabrous or with glandular exudate, rarely papillose, staminate flowers in clusters of 3–5 with tightly concentric ochreolae forming a truncate cylinder after the flowers have fallen, pistillate flowers solitary, ochreolae erect in flower, flattened against the rhachis in fruit, bracts ovate, 1–1.5 mm. long, ochreolae membranaceous 1–1.5 mm. long, flowering pedicels shorter than the ochreolae, hypanthium 0.5 mm. long, perianth lobes 1–1.5 mm. long, fertile stamens with filaments 1 mm. long; fruit ovoid, 8–10 mm. long, 6 mm. thick, perianth lobes 1–1.5 mm. long, coronate.

DISTRIBUTION: Jamaica, Hispaniola, Puerto Rico, Virgin Islands, St. Croix, Antigua, Montserrat, Guadeloupe, Martinique, St. Lucia, Barbados.

25a. **Coccoloba Swartzii** forma **pubescens**, forma nova.

A speciei ramis junioribus, petiolis, laminis ad basin, ochreis et rhachi inflorescentiae saltem at basin puberulis vel pilosis differt.

ANTIGUA: Sugar Loaf Mt., *Box 1543* (US), *1544* (US); Blubber Valley, *Box 1411* (TYPE, US), Orange Valley, *Box 1184* (US).
BARBUDA: Martello Tower, *John C. Beard 372* (A, MO); Codrington Village, *Fairchild 3830* (A, US), *Box 602* (US).
GUADELOUPE: *De Ponthieu 86* (FM).
CUBA: Oriente: Punta Padre, *Curbelo 224* (NY). Local name: *uvillon* (Cuba).

The significance of pubescence in the genus *Coccoloba* has not received any attention by the earlier monographers. I can do little in interpreting the variations in pubescence with the material on hand but it is hoped within the course of this study to have large collections from single plants and uniform populations to determine what variations are to be expected within one plant, within the species and to determine what factors cause pubescence. The specimens cited above differ from the species only in the presence of a pubescence which varies from minute papillae of epidermal cells to hairs many times the diameter of the epidermal cell. The

pubescence may be on all parts or only on a few. A long inflorescence may have a pilose pubescence at the base and only papillae near the apex of the rhachis. For the present it seems well to designate these variations as forms until the species can receive more adequate treatment in the field and perhaps cytological study.

26. **Coccoloba Cowellii** Britton, Bull. Torrey Bot. Club **42**: 368. 1915, (as *Coccolobis*).

Shrub to 3 m. tall; branches terete, puberulent when young becoming glabrate, commonly geniculate, nodes commonly tumid, ochreae subcoriaceous, 5–7 mm. tall, dark brown, puberulent; leaf blades ovate-elliptic to ovate-lanceolate, apex acuminate to rounded, base cordate, 9 × 6 cm. long and wide on normal shoots, coriaceous, strongly bullate, midrib and primary veins impressed above, prominent below, primary veins 5–7 pairs, arcuate anastomosing, upper leaf surface smooth, shining, lower leaf surface sparsely puberulent becoming glabrate, secondary venation obscure; petioles 3–6 mm. long, puberulent; leaves of vigorous shoots or of adventitious shoots extremely variable in shape usually lanceolate-ovate, long attenuate at the apex, cordate at the base, to 23 × 2.5 cm. long and wide; inflorescence terminal 11–23 cm. long, with several concentric ochreae at the base, rhachis glabrous, red in color; staminate flowers in clusters of 2–4, pistillate flowers solitary, bracts ovate, less than 0.5 mm. long, ochreolae membranaceous, to 0.5 mm. long, flowering pedicels 5 mm. long, bright red, perianth red, hypanthium 1 mm. long, perianth lobes 2 mm. long and broad, fertile stamens with filaments to 2 mm. long, functional pistil 2.5 mm. long; fruiting pedicels 5–10 mm. long, fruit dark red, ovoid, rounded at the base, attenuate at the apex, to 6 mm. long, 4 mm. thick, perianth lobes subcoronate, 1–2 mm. long at apex of fruit.

DISTRIBUTION: Cuba.

CUBA: Oriente: Loma del Mucaral, Nagua, S. of Yara, *Leon & Ekman 11031* (G). Camaguey: savannahs near Camaguey City, *Britton, Britton & Cowell 13151* (TYPE, NY; ISOTYPES, FM, MO, US); Santayana, *Leon 15787* (G, NY), *15789* (NY), *Ekman 19037* (S).

This is a striking species with its smooth shining bullate leaves and the handsome red inflorescence with flowers on long pedicels. Specimens collected in flower in April, June and July; collected in fruit in July.

The variation between the normal leaves and the leaves of vigorous and adventitious shoots is as striking in this species as any in the genus. More extensive collections of this species are desired.

27. **Coccoloba diversifolia** Jacq. Enum. Pl. 19. 1760, Hist. Stirp. Amer. 114, *pl. 76*. 1763.

Coccoloba cubensis Meisn., DC. Prodr. **14**: 162. 1857.
Uvifera cubensis O. Ktze. Rev. Gen. **2**: 561. 1891.
Coccoloba floridana Meisn., DC. Prodr. **14**: 165. 1857.
Coccoloba Curtissii Lindau, Engl. Bot. Jahrb. **13**: 159. 1891.
Uvifera Curtissii O. Ktze. Rev. Gen. **2**: 561. 1891.

Coccoloba laurifolia Lindau, Engl. Bot. Jahrb. **13**: 158. 1891, and all recent authors, not Jacquin.
Coccoloba longifolia Schmidt, Fedde Rep. **24**: 73. 1927, not Fischer.
Guaiabara laurifolia (Jacq.) House, Am. Midl. Nat. **8**: 64. 1922 (as *Guaibara*).

Shrub or tree to 7 m. tall; branches terete, often geniculate by limited growth, glabrous, nodes rarely slightly tumid; ochreae coriaceous in the lower portion, this persisting, membranaceous and deciduous above, 3–5 mm. long; leaf blades ovate, oval, oblong, elliptic, lanceolate or obovate, variable on a single shoot, apex rounded, obtuse, acute or acuminate, base cuneate to rounded or subcordate, 4 × 3.5, 7 × 5.5, 8 × 4.5, 12 × 8 cm. long and wide, coriaceous, often shining above, dull beneath, glabrous, midrib and primary veins slightly prominent above, secondary venation reticulate on both surfaces, primary veins 3–7 pairs, arcuate, anastomosing before reaching the margin, margin entire, commonly slightly recurved; petioles glabrous, 7–10 mm. long; leaves of adventitious shoots similar in shape to those of normal growth but larger in size, 17 × 8, 24 × 13, 32 × 12.5 cm. long and wide, on petioles 1–2.5 cm. long; leaves of wind-swept specimens often much smaller than those of normal shoots, 2 × 1.3, 3 × 2 cm. long and wide; inflorescence terminal, 4.5, 9, 11 to 18 cm. long, rhachis glabrous; staminate flowers in clusters of 2–5, pistillate flowers solitary; bracts ovate, less than 0.5 mm. long, 1 mm. broad, glabrous; ochreolae membranaceous, less than 0.5 mm. long, glabrous, flowering pedicels 2–4 mm. long, glabrous; hypanthium 1 mm. long, perianth lobes 2 × 2 to 3 × 1 mm. long and broad, filaments of stamens from male flowers 1 mm. long; fruiting pedicels 3–4.5 mm. long, fruit globose to obpyriform, 10 × 7, 12 × 8, 13 × 8 mm. long and thick, perianth lobes appressed at the apex of the achene.

DISTRIBUTION: Florida, Bahamas, Greater and Lesser Antilles.

CUBA: Oriente: Santiago and vicinity, *Ekman 1399* (S), *Ekman 7776* (S), *Ekman 8938* (FM, S), *Ekman 8962* (MO, S), *Havard 20* (NY), *Leon & Clemente 3045* (G, HAB), *Clemente 3792* (G, HAB), *3793* (G, HAB); Bayate, Monte Oscuro, *Ekman 6110* (NY, S), *6247* (MICH, S, US), *4628* (S); Bayate at Paso Estancia, *Ekman 6276* (A, S); Monte de Ocujal, near Central Manate, *Leon 15759* (G, NY, HAB), *Leon 16796* (HAB); Punta Maisi, *Shafer 7929* (FM, NY, US); Preston, *Ekman 3470* (FM, S); Jiguani, *Ekman 15028* (G, MO, S); Gibara to Punta Hicacos, *Shafer 1473* (NY, US); Punta Piedra, Nipe Bay, *Britton, Britton & Cowell 12487* (NY); Imías, *Leon 12157* (NY), *12486* (NY); Sabanalamar, near Central Manati, *Leon 15737* (NY); Cupey, *Ekman 4942* (FM, S), *6300* (S); Palma Sola, *Wright 112* (HABA); Sierra de Nipe, near Rio Piloto, *Ekman 5795* (S); Banes, near Puerto Rico, *Ekman 6632* (S); Locality unspecified, *Linden 2047* (BR, K, TYPE of *C. cubensis*), *Wright 3668* (G), *Le Roy*, without number (NY). Camaguey: La Gloria, *Shafer 415* (FM, G, NY, US); Santa Luces, *Shafer 952* (FM, G, NY, US); Ganado, Cayo Sabinal, *Shafer 898* (NY, US). Isle of Pines: Milian, N. of Caleta Grande, *Roig & Cremata 1853* (NY); S. of Santa Fe, *Jennings 656* (G, NY, US). Collected in flower: May, July, Nov. Collected in fruit:

Feb., Mar., Apr., June, July, Aug., Sept., Nov., Dec. Local names in Cuba: *uvilla, uvillo, uverillo, uva de paloma, fruta de paloma.*

For many years a species of *Coccoloba* with sessile flowers and fruit, that is, the pedicels shorter than the ochreolae, has been passing under the name of *C. diversifolia* Jacq. The drawing of *C. diversifolia* in the original publications by Jacquin shows a fruiting specimen with pedicels 3–4 times the length of the ochreolae. It is obvious therefore that material called by all recent authors *C. laurifolia* is really *C. diversifolia* Jacq. *Coccoloba laurifolia* Jacq. is based on a flowering specimen collected near Caracas, Venezuela. Sufficient material from S. America is not available to me at the present time to determine if this is identical with the W. Indian *C. diversifolia* here treated. It may well be, and *C. laurifolia* Jacq. may well belong in the synonymy of the present species. In any case *C. laurifolia* Jacq. is a later name than *C. diversifolia* which must be used for the specimens under consideration here. All recent authors have overlooked this misinterpretation and it is unfortunate that such a widespread species and one commonly used as a horticultural plant must have a change of name.

The type drawing of *C. diversifolia* Jacq. can be matched in any one of a dozen of the collections cited above. The leaf variation is tremendous on a single herbarium sheet and on single trees which I have observed in the field. Young vigorous shoots may have large leaves. Specimens growing along the sea coast and exposed to strong winds and salt spray are often much contorted in form and the leaves are much smaller than protected plants growing a few yards farther inland. In the Bahamas it was possible to observe the effect of cutting of these trees to clear garden patches. Recently cut trees developed large, fast-growing adventitious shoots with tremendous leaves wnen compared with the undisturbed trees. Many of these adventitious shoots and leaves match the specimens which Schmidt referred to *C. longifolia* Fisch. ex Lindau (*Ekman 1399, 4628*).

As in many other species of *Coccoloba* in the Caribbean the fruits of *C. diversifolia* will commonly change shape in the process of maturing. For that reason it is difficult to use the shape of the fruit as diagnostic of a species. Fully mature fruits must be used in comparison of size and shape in this species.

Coccoloba cubensis of Meisner was based on a collection made by Linden. I have seen two specimens of this collection from the Brussels and Kew Herbaria. Both are similar and the leaves are small in comparison with the bulk of the material cited above. If this species were considered from the standpoint of the Cuban material alone, then *C. cubensis* would be comparable to the recent material from the Isle of Pines and might be worthy of varietal status; however, when material from the Bahamas, Florida, Jamaica, Puerto Rico and Hispaniola is considered, then the Linden specimens become one end of a long line of variations.

Lindau described the species *Coccoloba Curtissii* based on two collections of Curtiss from Florida, one from the Florida Keys and the other

from Merritts Island. Lindau distinguished this species on the presence of small protuberances (teeth) between the stamens in the flowers. Unfortunately Lindau did not recognize the unisexual condition of the flowers in *Coccoloba*. The specimens of Curtiss cited by Lindau are staminate and the protuberances which he mentioned can be found in many flowers of the specimens cited above.

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